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International Adult Literacy Survey

Learning Literacy in Canada:

Evidence from the International Survey of Reading Skills

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Acronyms

2PLM	Two-Parameter Logistic Model
ALL	Adult Literacy and Life-skills
DS	Digit Span
ESL	English as a Second Language
GDP	Gross domestic product per capita
IALS	International Adult Literacy Survey
IALSS	International Adult Literacy and Skills Survey
IRT	Item Response Theory
ISRS	International Study of Reading Skills
LCA	Latent Class Analysis
OECD	Organisation for Economic Co-operation and Development
PPVT-m	Peabody Picture Vocabulary Test (modified)
PSU	Primary sampling units
RAN	Rapid Automatized Naming – Letters
TOWRE-A	Test of Word Reading Efficiency – Real Words
TOWRE-B	Test of Word Reading Efficiency – Pseudo-words

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Note of appreciation

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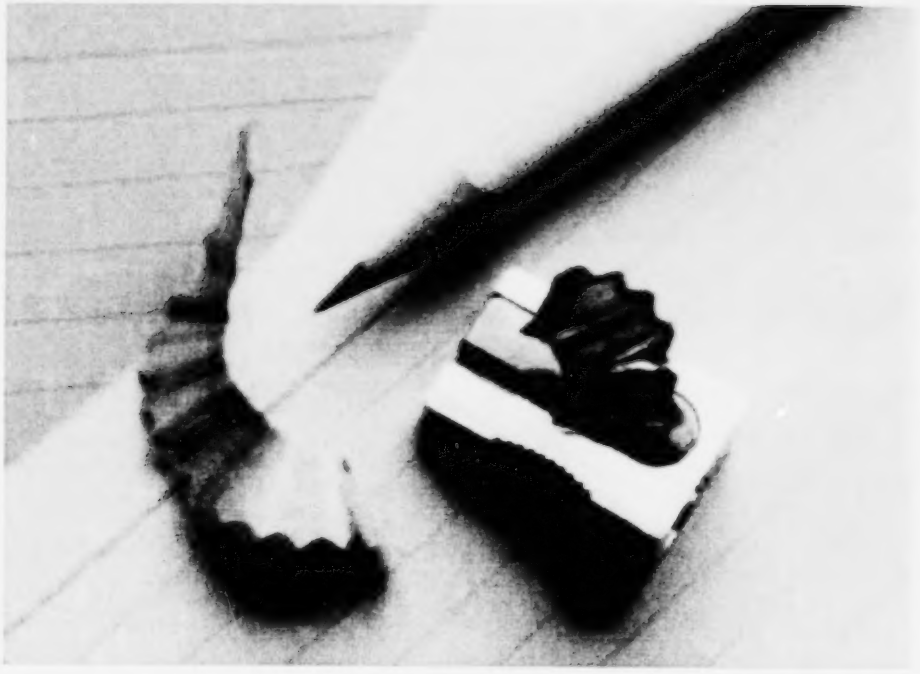

Foreword

Canada's future economic prosperity depends on success in trade in an increasingly global knowledge economy. Hence Canadians, and the policy makers serving them, have a vested interest in understanding the factors that might boost individual and collective competitiveness. Canada also is a country committed to equal opportunity, one in which all citizens have fair and equal access to the benefits the country can provide. Thus, Canadians have a vested interest in understanding the causes and consequences of social inequality, including inequality that stems from differences in how well individuals can read.

Literacy – the ability to access and apply information gleaned from the printed word – is known from research studies to enable individual access to social and economic systems, and to play a key role in overall development. The level and distribution of adult literacy in the population influence long term economic growth and are associated with large differences in employment, wages, health, access to learning opportunities, and participation in broader society. Canada's level of adult literacy is comparatively high yet many citizens fail to reach the threshold level of skill required to contribute fully.

Many observers have called for public investment to increase the stock of literacy skill available to the economy and to help contain rising social inequality. If one accepts, for the sake of argument, that additional investment is needed to raise Canada's adult skill levels, and further that this should be publicly financed, then one must decide how much new investment is warranted, what types of programs are needed to serve adults with what types of reading challenges, where these programs would be best provided, and how best to motivate adults to participate.

Ironically, little is known about the learning needs of Canadians with low literacy skills. National literacy surveys have identified the main characteristics of persons likely to have low skills, where they live, and how low skill influences their quality of life. Helpful though this information is, these surveys were not designed to define the programs and types of instruction that might assist adults in improving their skills.

The evidence presented in this initial report from the International Survey of Reading Skills, a study designed jointly with institutions in the United States, fills several gaps in what is known about the learning needs of Canadians with low literacy skills – a basis for judging whether, where and how much public investment is warranted, and for educators to develop more effective remedial programs.

T. Scott Murray

Satya Brink

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Chapter 1

Purpose, theories and methods

This opening chapter describes the purpose and specific objectives of the International Study of Reading Skills. It also offers a summary overview of the theoretical foundations, the definitions applied in the study, and the instruments used for the data collection. A few preliminary comments on the significance and limitations of the study are also given. The next section sets the stage for the study by reviewing some issues and questions that are pertinent to policy makers, educators and literacy advocates in Canada.

1.1 The policy context

Canada has a comparatively high level of educational attainment, one outcome of spending more on education as a percentage of GDP than most OECD countries over decades. Canada also has applied a selective immigration policy, a fact that explains why immigrants arrive with higher levels of educational attainment than their Canadian-born peers. Together, Canada's education and immigration policies have contributed to creating one of the highest standards of living in the world. These policies also have allowed Canadian workers and firms to compete successfully in an increasingly global economy. The same policies have also helped to shape what many believe to be one of the most tolerant, culturally diverse and creative societies in the world.

Literacy – the ability to access and apply information gleaned from the printed word – is known from research studies to enable access to social and economic systems, and to play a key role in determining long-term economic growth rates (Coulombe and Tremblay, 2006; Coulombe, Tremblay and Marchand, 2004). Furthermore, differences in the level and distribution of adult literacy are associated with large differences in employment, wages, health, lifelong learning opportunities, and participation in broader society.

Although Canada has one of the highest levels of average literacy skill among OECD countries (OECD and Statistics Canada, 2000; 2005), many adults do not possess the requisite level of skill observers believe are needed to maintain competitiveness in an increasingly global knowledge economy. This observation has led to a call for new investment in adult literacy training (Canadian Council on Learning, 2006; Movement for Canadian Literacy, 2006). Arguments for additional investment have been justified in three ways. First, the case has been made on the basis of fairness, as investment needed to level the playing field, to allow all Canadians full and equal access to labour markets, health services, education systems and democratic institutions. Second, the argument has been advanced on the basis of broad economic self-interest, as investment needed to maintain the position of the nation in the global knowledge economy. Finally, the case has been justified on the basis of narrow economic self-interest, as a means to reduce the demand for, and cost of, delivering public goods and services such as education, health and criminal justice.

A large body of empirical evidence, much of it generated by secondary analyses of data collected for the International Adult Literacy Survey, supports the three claims, showing *inter alia*:

- Large differences in the average level and distribution of literacy and numeracy competencies exist between Canada and many of its key competitors;
- Differences in the average level and distribution of literacy and numeracy exist among Canada's provinces and territories, with scores declining from West to East;
- These skill differences matter to individual quality of life over a range of outcomes, including employability, wages, physical health, social engagement, and access to lifelong learning opportunities. They also explain a significant proportion of the variance in long-term GDP growth rates in advanced OECD countries;
- Shifts in economic structures, work organizations and technologies of production are expected to amplify the impact that literacy has on individual and collective outcomes. Key among these is the impact of literacy on the rate at which firms can adopt advances in information and communication technologies;
- Rapid increases in the global supply of economically important skills, including literacy, are expected to place severe pressure on employment and wage rates as multi-national firms shift production to lower cost but equally skilled labour markets; and
- Large proportions of key population groups including recent secondary graduates and aboriginal peoples fail to attain, or retain, the threshold of literacy and numeracy deemed necessary to meeting the rising skill demands in the economy and society.

The results presented in this volume will shed light on how to improve the literacy of low-skilled (level 1 and 2) adults and on how to help youth avoid leaving initial education with low literacy skills. In addition, the ISRS findings presented will help policy makers determine how best to invest in literacy skills development by providing answers to the following questions:

1. What are the learning needs of different groups of low skilled adults?
2. What kind of intervention programs would be needed to achieve this goal?
3. What magnitude of investment would yield a marked improvement in skill?
4. Where, given the implicit trade-offs between efficiency and equity, would new investments have the most impact?
5. Who should underwrite the costs of this investment? Is there evidence of a market failure of the sort that would justify public investment? Do individuals and families have the financial resources to underwrite a part of the cost of improving their skill levels? What role should employers pay in financing literacy programs?
6. What are the consequences of inaction? What are the opportunity costs of investing in literacy?

Answers to these questions depend upon a subtle understanding of the literacy learning needs of different groups of adults, most particularly those with the lowest skill levels. But despite the fact that Canada has acted as a pathfinder in developing valid and reliable measures of adult literacy, little data is currently available to shed light on these questions.

1.2 Purpose of the study

This report uses data from a new study, the International Study of Reading Skills (ISRS), to address the issues raised above. The main purpose is to describe in depth the reading abilities of the least-skilled adult readers in society and to identify the basic reading profiles of these adults, based on their strengths and needs in reading. The goal is to supply policy makers, researchers and practitioners with new information useful for making decisions about how to plan and deliver appropriate and efficient reading instruction for different adult learners. As such, the current report only addresses the first of the six questions enumerated above.

Specifically, the ISRS was designed to characterize the reading profiles and learning needs of demographically different groups of low skilled Canadian adults by administering a battery of clinical reading tests to a sample of adults who previously had participated in an international literacy assessment. The new data set should inform the development of better diagnostic systems for low skilled adults, tailoring the content and modalities of instruction to their needs, and creating improved strategies to encourage active participation by adult learners.

The ISRS study has the potential to shed light on all but the last question listed above. Answers to the 6th question, however, will only emerge from a nuanced analysis of Canada's economic prospects by a range of public and private actors and a focussed public debate.

As explained in Box 1.1, Canadian and US based teams jointly developed the ISRS, building on the theories and assessment frameworks developed for two prior international assessments of adult literacy: the International Adult Literacy Survey (IALS) fielded in 20 countries between 1994 and 1998, and the International Adult Literacy and Skills Survey (IALSS), implemented in seven countries or territories in 2003. Representative sub-samples of respondents to the English and French variants of the IALSS were selected for the Canadian component of the ISRS. Since the

ISRS was a follow-up to the IALSS the information gathered from the two surveys could be combined and used together in analyzing the data.

Box 1.1 The international dimension of the study

The ISRS has an international dimension not only because it builds on large-scale comparative assessments of adult literacy but also because its design, data collection and analysis involved several US and Canadian research teams.

The ISRS is a joint project of the Educational Testing Service, Princeton and Statistics Canada, Ottawa, implemented in co-operation with the National Center for the Study of Adult Learning and Literacy at the Harvard Graduate School in Boston and Westat, Inc. based in Maryland.

Human Resources and Social Development Canada and Statistics Canada funded the Canadian part of the study while the US part was financed by the Office of Vocational and Adult Education and the National Center for Education Statistics of the US Department of Education.

The US and Canadian studies had slightly different objectives and surveyed different populations but shared common approaches to measuring component reading skills. Initial results of the US study may be found in Adult Education in America: A First Look at Results from the Adult Education Program and Learners Surveys (ETS, 2007).

1.3 Theory, definitions and instruments

"Low skill" in the ISRS was defined as proficiency below Level 3 on the IALSS prose literacy scale, a choice in keeping with the view that Level 3 is the desired threshold needed by adults to participate fully and fairly in the knowledge economy, given that Level 3 skills are known to be associated with satisfactory job performance in the overwhelming majority of Canadian occupations, with the effective use of public health information and with active community participation (Statistics Canada and OECD, 2005; Statistics Canada, 2005). The Level 3 threshold is also one that reading researchers believe represents a point at which there is an important shift in the underlying cognitive strategies that readers must deploy to access and apply information embedded in print.

The Canadian component of the ISRS selected representative sub-samples of a total of 1,815 respondents in the 10 provinces; 986 of them completed the tasks in English, and 829 did so in French. There were 232, 332 and 422 individuals at Levels 1, 2 and 3+ in the English sample, and 98, 312 and 419 individuals at Levels 1, 2 and 3+ in the French sample.

Adults scoring at Levels 1 and 2 were over-sampled in order to provide a means of studying the relationship of the component skills and the prose literacy scale.

The ISRS sample included every French language adult classified at Level 1 in the IALSS study who accepted to be re-contacted. Although the number of such adults was lower than desired the resulting estimates represent the adult population of Canada aged 16 to 65 living in the 10 provinces.

The ISRS was administered in respondents' homes using several instruments. First, respondents were invited to complete a background questionnaire, which consisted of several information modules required to relate the tested skills to social

and economic background variables. They were asked a series of questions about their education, the language they use in various situations and their labour force status and another set of questions about health and disabilities. Next the prose and document literacy component, which required respondents to complete a number of tasks, were administered. First there was a booklet of nine simple tasks, and if respondents successfully completed at least three of them, they were given a second test booklet containing 31 tasks. If they did not, they moved directly to the survey's third component, a series of additional exercises designed to measure reading-related component skills.

For prose literacy the IALSS definition is used – the knowledge and skills needed to understand and use information from texts including editorials, news stories, brochures and instruction manuals. Similarly, document literacy is defined as the knowledge and skills required for locating and using information contained in various formats, including job applications, payroll forms, transportation schedules, maps, tables and charts.

Prose literacy and document literacy are measured on a scale of 0 to 500. Each result on the scale represents a point at which a person has an 80 percent chance of correctly performing a task associated with an equivalent level of difficulty. To simplify reporting of the results, the scales are also divided into five levels, with each level representing a set of tasks that an individual at that level is capable of performing. Table 1.1 describes the increasing levels of task difficulty.

Table 1.1

Five levels of difficulty for the prose and document literacy scale

	Prose	Document
Level 1 (0 to 225 points)	Most of the tasks in this level require the respondent to read relatively short text to locate a single piece of information that is identical to or synonymous with the information given in the question or directive. If plausible but incorrect information is present in the text, it tends not to be located near the correct information.	Tasks in this level tend to require the respondent either to locate a piece of information based on a literal match or to enter information from personal knowledge onto a document. Little, if any, distracting information is present.
Level 2 (226 to 275 points)	Some tasks in this level require respondents to locate a single piece of information in the text; however, several distractors or plausible but incorrect pieces of information may be present, or low-level inferences may be required. Other tasks require the respondent to integrate two or more pieces of information or to compare and contrast easily identifiable information based on a criterion provided in the question or directive.	Tasks in this level are more varied than those in Level 1. Some require the respondents to match a single piece of information; however, several distractors may be present, or the match may require low-level inferences. Tasks in this level may also ask the respondent to cycle through information in a document or to integrate information from various parts of a document.
Level 3 (276 to 325 points)	Tasks in this level tend to require respondents to make literal or synonymous matches between the text and information given in the task, or to make matches that require low-level inferences. Other tasks ask respondents to integrate information from dense or lengthy text that contains no organizational aids such as headings. Respondents may also be asked to generate a response based on information that can be easily identified in the text. Distracting information is present, but is not located near the correct information.	Some tasks in this level require the respondent to integrate multiple pieces of information from one or more documents. Others ask respondents to cycle through rather complex tables or graphs containing information that is irrelevant or inappropriate to the task.
Level 4 (326 to 375 points)	These tasks require respondents to perform multiple-feature matches and to integrate or synthesize information from complex or lengthy passages. More complex inferences are needed to perform successfully. Conditional information is frequently present in tasks at this level and must be taken into consideration by the respondent.	Tasks in this level, like those at the previous levels, ask respondents to perform multiple-feature matches, cycle through documents, and integrate information; however, they require a greater degree of inference. Many of these tasks require respondents to provide numerous responses but do not designate how many responses are needed. Conditional information is also present in the document tasks at this level and must be taken into account by the respondent.
Level 5 (376 to 500 points)	Some tasks in this level require the respondent to search for information in a dense text that contains a number of plausible distractors. Others ask respondents to make high-level inferences or use specialized background knowledge. Some tasks ask respondents to contrast complex information.	Tasks in this level require the respondent to search through complex displays that contain multiple distractors, to make high-level text-based inferences, and to use specialized knowledge.

Source: *Learning a Living: Initial Results of the Adult Literacy and Life Skills Survey.*

The clinical reading tests administered in the ISRS study measure the word reading and vocabulary skills that are thought to underlie the emergence of the fluent and automatic reading associated with Level 3 performance on the IALS and IALSS prose literacy scales. Although the emergence of fluent and automatic reading also depends on other factors, research studies cited in Chapter 3 have shown that few learners manage to reach Level 3 proficiency without having first mastered these component skills. Hence mastery of component skills is a necessary but not sufficient condition for the acquisition of Level 3 performance. Other factors also play a role, including the relevance of the material for readers' lives or whether they are familiar with the specific genre of text, e.g., fiction, academic writing, persuasive essays, poetry, etc. Notwithstanding these factors, individual performance on the clinical reading tests used in the ISRS explains up to 80 percent of performance on the overall literacy proficiency scale.

The component measures administered as part of the ISRS were selected for several related considerations. First, it had to have been established on both theoretical and empirical grounds that the specific component was important to the acquisition of Level 3 skills. Chapter 3 describes the theory and evidence underlying the reading components assessed in the ISRS. Second, the measures had to be amenable to administration by non-specialist interviewers within the context of a household survey. Third, the measures had to display good psychometric properties in terms of their validity, reliability and comparability. Finally, equivalent measures were to be employed to assess component skills in both English and French. Although conceptually identical, it was found they did not provide results that are strictly comparable. Accordingly, the relationships among the components and between them and the emergence of fluent and automatic reading were shown to differ in certain respects between the two language groups. Apart from collecting data on the component reading measures, the respondents to the ISRS also were assessed in terms of their ability to understand spoken English or French, and to speak it intelligibly at a native conversational pace on everyday topics.

Six instruments were used to measure the reading-related component skills. The first was the abridged Peabody Picture Vocabulary Test (PPVT-m), which required respondents to identify which of four different images corresponded to a word spoken by the interviewer. Second came the Rapid Automatized Naming (RAN) test, in which respondents were asked to read a series of random letters as quickly as possible. The third exercise concerned the Test of Word Recognition Efficiency, requiring one to read a list of real words (TOWRE-A), followed by a list of pseudo-words (TOWRE-B), as quickly as possible. The time limit for each word list is usually 45 seconds, however to get as much variability as possible a 60 second limit was used in the ISRS. The fourth instrument was PhonePass, which contained three different tasks: repetition of simple sentences, a set of short-answer questions, and reading of simple sentences. The fifth test involved repeating a series of digits in order and another series of digits in reverse order. The final exercise was a spelling test.

The component measures were scored individually. In order to facilitate analysis the raw component scores were scaled separately using a two-parameter logistic (2PL) model based on the Item Response Theory (Birnbaum, 1968; Lord, 1980). The score for each component varies from 0 to 1 and represents the expected proportion correct on the entire test. More information about the scaling of the components is given in Annex B.

1.4 Significance and limitations

The ISRS of the component reading profiles and learning needs of low skilled adults is by far the largest of its kind ever undertaken in Canada. The study uses a large, representative sample of adults in order to support the generalization of results and also provides a means to estimate the absolute number of different types of adult learners in the population.

Despite the utility of the ISRS findings for educators, researchers and policy makers, the study is not without its limitations. The French and English findings were analyzed separately, both to capture differences in how the component measures relate to overall reading ability and to reflect large demographic differences between the two populations, particularly with respect to the characteristics of immigrants. Interpretation of the findings is also made more complex than is usually the case in survey research because the population sampled for the ISRS is a subgroup of those who participated previously in the IALSS, with a focus on those scoring at the lowest levels of literacy proficiency. Unfortunately the least literate respondents were also those who had the highest refusal and non-response rates among those sampled. Although statistical procedures were implemented to correct for non-response bias some residual upward bias in component scores may be present.

Large as they are compared to other research studies in the field, the sample sizes fielded in the ISRS are still relatively small. The limited number of low skilled respondents available from the IALSS and the high cost of administering the component reading tests to a geographically widely distributed sample of adults in 10 provinces, precluded further increases of the ISRS sample sizes. Having established the utility of the approach future research could expand the scope of the enquiry in useful ways.

Given the link of the ISRS to major comparative literacy assessments, every effort was made to establish the validity, reliability, comparability and interpretability of estimates, and to control and quantify errors that might interfere with or bias interpretation. Notes to Charts and tables are used to alert readers whenever errors might affect interpretation. The data presented in this report are estimated from representative but complex samples of adults in Canada. The sample design is described in Annex A. Tables reporting the results of the data analyses are included in Annex C. These annex tables also give the standard errors, in parenthesis, next to the actual estimates, expressing the degree of uncertainty associated with both sampling and measurement errors. Even though the sample size of the ISRS is the largest that has been used for this type of study to date, some key statistics have coefficients of variation that are higher than the standard cut off set by Statistics Canada for publication and as such are suppressed in the data presented in this report.

1.5. Organization of the report

The report is divided into five chapters and is supported by five annexes.

Chapter 1 is the Introduction.

Chapter 2 presents an overview of the characteristics of adults who perform at Levels 1 and 2 on the IALSS proficiency scales, including their distribution by age group, gender, educational attainment, immigrant status and income characteristics. The chapter also highlights differences between adults at these levels in each of Canada's official languages and provides a rationale as to why the attainment of Level 3 skill is so important. This chapter uses the IALSS Canadian dataset, which has a larger sample size than the ISRS and, hence, can offer more reliable estimates of key characteristics.

Chapter 3 describes the theories and evidence derived from previous research studies that underlie the reading components that were assessed, and sets out their pertinence for instruction.

Chapter 4 explores the relationships between performance on the separate reading components and the emergence of fluent and automatic reading skill defined as the attainment of Level 3 prose literacy in each of Canada's official languages. This chapter also defines different groups of learners based upon their patterns of component skills and attempts to tease out what these patterns imply for the content, structure, mode and duration of remedial instruction. This chapter also explores the relationship between patterns of component skills, underlying causal factors and a range of social and economic outcomes observed at the individual level.

Chapter 5 presents a summary of key findings and a few implications for literacy policy and program design and delivery.

Annex A describes the survey and sample design employed.

Annex B explains the methods and statistical models applied in scaling and proficiency estimation.

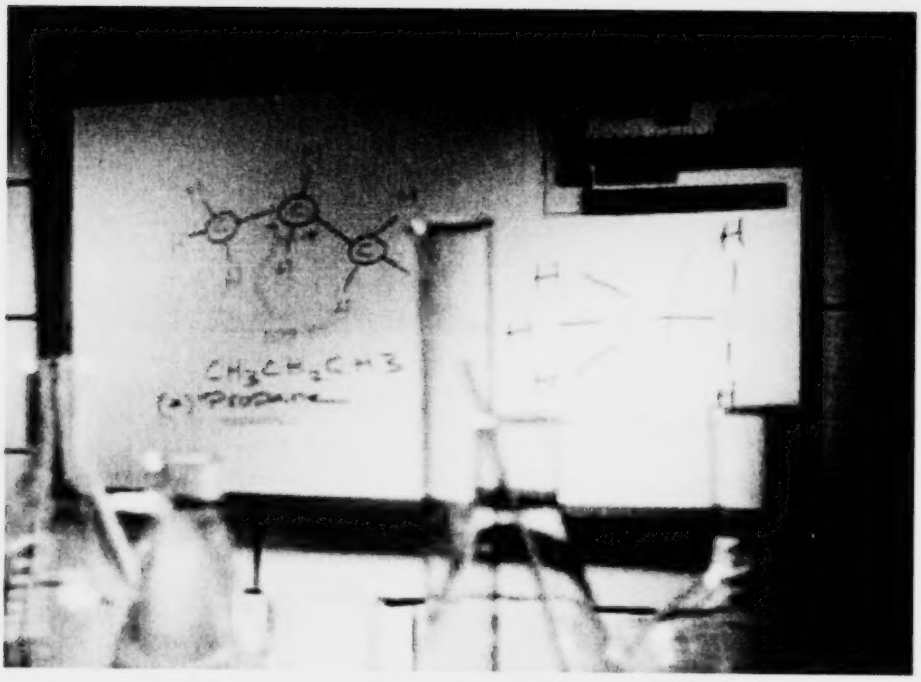
Annex C is the statistical annex. It provides the estimates and associated standard errors for all data analyses presented in the report.

Annex D lists the references cited in the text and offers suggestions for further reading.

Annex E finally, identifies the individuals and institutions that contributed to the study

Author

Sylvie Grenier and T. Scott Murray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Chapter 2

Demographic profiles of Canadians with low literacy proficiency

The purpose of this chapter is to provide a descriptive profile of Canadians with low literacy based on their key demographic and economic characteristics using IALSS. It is important to know who these people are as we attempt to understand the components of reading skills and their implications for those with low literacy in the subsequent chapters.

The IALSS, conducted in 2003, established that about nine million Canadians of working age, or 42 percent of those aged 16 to 65, scored below Level 3 on the prose literacy scale. Furthermore, it was found that the proportion of working age Canadians with literacy proficiency below Level 3 had not changed since 1994, the year the first comparative survey of adult literacy was undertaken in Canada. In fact, the number of people in this category had increased by one million over the decade as a result of overall population growth. More specifically, in 2003, nearly 3.1 million Canadians were at proficiency Level 1 on the prose literacy scale and another 5.8 million were at Level 2 (Statistics Canada, 2005).

The following sections describe the population scoring at Levels 1 and 2 on the prose literacy scale (low proficiency) by comparing them to the population at Levels 3, 4 and 5 (medium to high proficiency). Characteristics such as age, education, gender immigration status, mother tongue, reading practices, labour force participation and income are examined. For most data analyses the samples of people who took the test in English and in French are pooled. However, the data are presented separately for the two language groups in cases where significant differences are noted. In order to obtain more reliable estimates of key characteristics, all the analyses undertaken for this chapter were conducted using 2003 data from the International Adult Literacy and Skills Survey (IALSS), as this dataset has a much larger sample size than the one generated for the ISRS. However, in order to maintain comparability

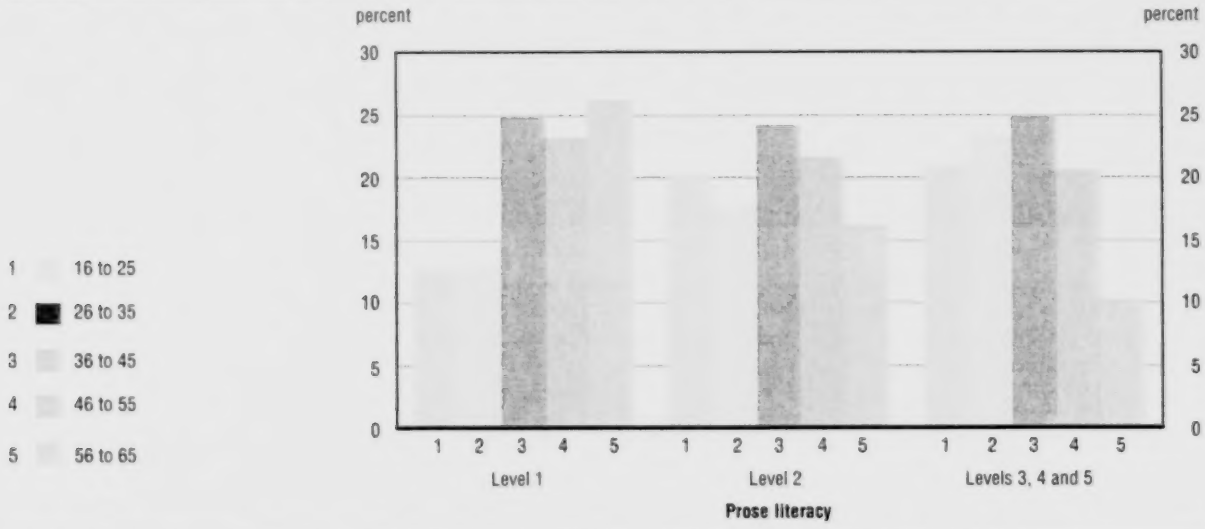
with the ISRS coverage, populations from Canada's three Territories were excluded from the data analyses.

2.1 Literacy proficiency by age

As seen in Chart 2.1, all age groups are represented in each of the literacy proficiency levels. However, the lowest proficiency level is composed of a much higher percentage of those in the older age groups whereas the highest proficiency level is composed of a much higher proportion of those in the younger age groups. For example, roughly twice as many of those at Level 1 were 56 to 65 years old (26%) compared to those 16 to 25 years old (13%) and those 26 to 35 years old (13%). In contrast, more than twice as many of those at Level 3, 4 and 5 were 16 to 25 years old (21%) compared to those 56 to 65 years old (10%).

Chart 2.1

Distribution of prose proficiency levels, by age group, Canada excluding Territories, population aged 16 to 65, 2003



Note: See Table C.2.1 in Annex C.

2.2 Educational attainment

The importance of secondary schooling for literacy proficiency is clear from Chart 2.2.

While nearly 60 percent of individuals at Levels 3, 4 and 5 had completed post-secondary education, 50 percent of the individuals (about 1.6 million people) with scores at Level 1 on the prose literacy scale had not finished high school, and 30 percent (about 940,000 people) had finished high school.

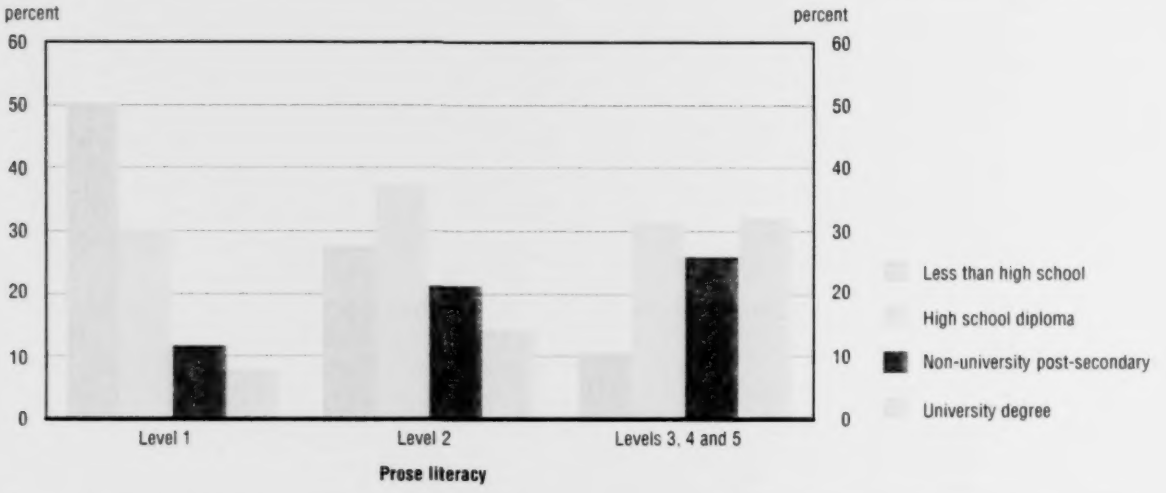
About 37 percent of those at Level 2 prose proficiency had completed high school. A lower proportion of those scoring at Level 2 in prose proficiency had not completed high school (27% or 1.6 million people) and 14 percent (or 820,000 people) had completed their university degrees. A significant number of those with university education were immigrants whose mother tongue was neither English nor French. At Level 1 immigrants with a mother tongue other than English or French represented around 69 percent (or 166,000 persons) of those with a university degree

(representing 242,000) and at Level 2 they represented approximately 37 percent (or 307,000 out of 819,000 university graduates).

Chart 2.2 indicates that; among those with less than a high school education and among post secondary graduates (non-university post-secondary and university graduates), the distribution corresponded to the expected results: those in Level 1 are composed of a much higher percentage of Canadians with less then high school education while those in Level 3,4 and 5 are composed of a much lower percentage on those with high school education. In contrast, those in Level 1 are composed of a much lower percentage of post secondary graduates whereas those in Level 3, 4 and 5 are composed of a much higher percentage of post secondary graduates. The proportion of high school graduates within each of the Levels was relatively similar.

Chart 2.2

Distribution of proficiency levels, by educational attainment, Canada excluding Territories, population aged 16 to 65, 2003



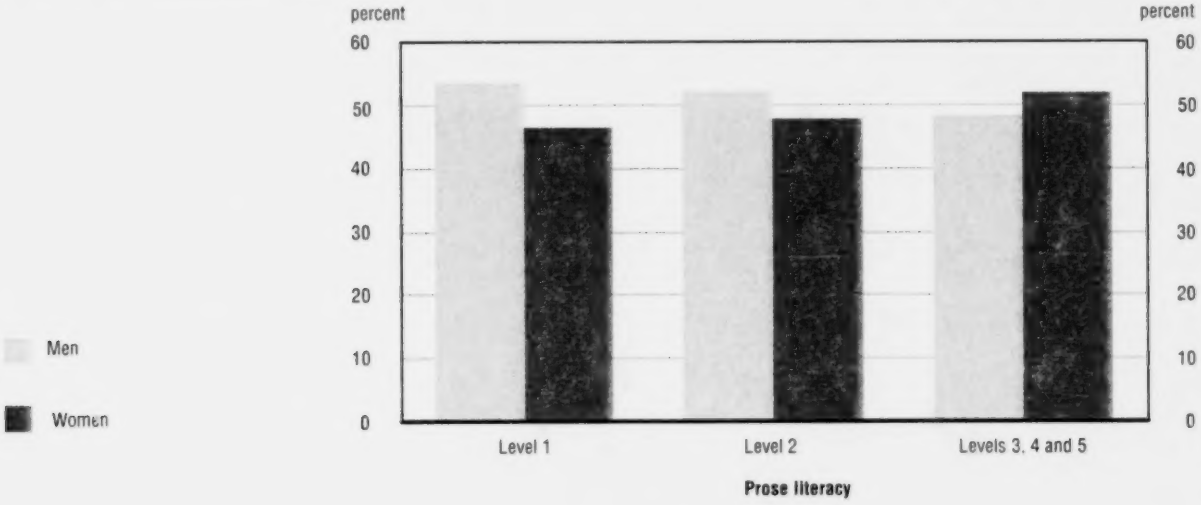
Note: See Table C.2.2 in Annex C.

2.3 Gender differences

The findings from IALSS suggests that differences in average prose literacy scores between men and women are slightly in favour of women, consistent with earlier findings from IALS (1994 to 1998). However, as evident in Chart 2.3, there are equal proportions of men and women at each level of prose literacy. Among those performing at Level 1, there are 54% men and 46% women, however, the difference is not statistically significant at the 5% level of confidence.

Chart 2.3

Distribution of prose proficiency levels, by gender, Canada excluding Territories, population aged 16 to 65, 2003



Note: See Table C.2.3 in Annex C.

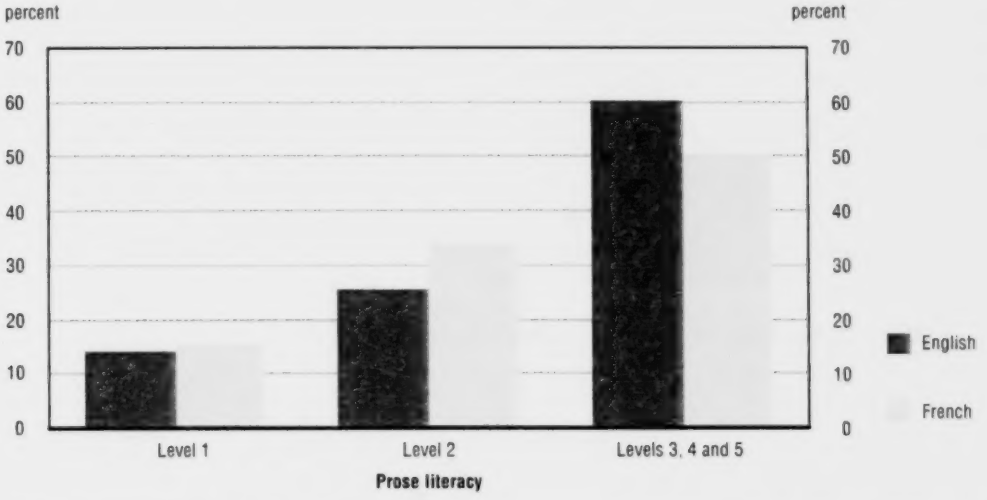
2.4 Language of assessment

As shown in Chart 2.4, the distribution by language of assessment (English or French) varied between those scoring at Level 2 and the higher proficiency levels but not at Level 1. In comparison to people assessed in English, a significantly higher percentage of individuals who chose to take the test in French achieved Level 2 proficiency.

Among all Canadians aged 16 to 65 who took the test in French (representing approximately 4.7 million persons), 16 percent (representing 740,000 persons) had Level 1 proficiency and 34 percent (1.6 million persons) achieved Level 2. However, among Canadians who were assessed in English (representing 16.6 millions persons), 14 percent (representing 2.4 million persons) had Level 1 proficiency compared to 25 percent (4.2 million) who scored at Level 2. Overall, 60 percent of those who took the test in English and 50 percent of those who took the test in French achieved the desired Level 3 competency or higher. Therefore, about 40 percent of those who took the test in English and 50 percent of those who took the test in French did not meet the standard.

Chart 2.4

Distribution of prose proficiency levels, by language of assessment, Canada excluding Territories, population aged 16 to 65, 2003



Note: See Table C.2.4 in Annex C.

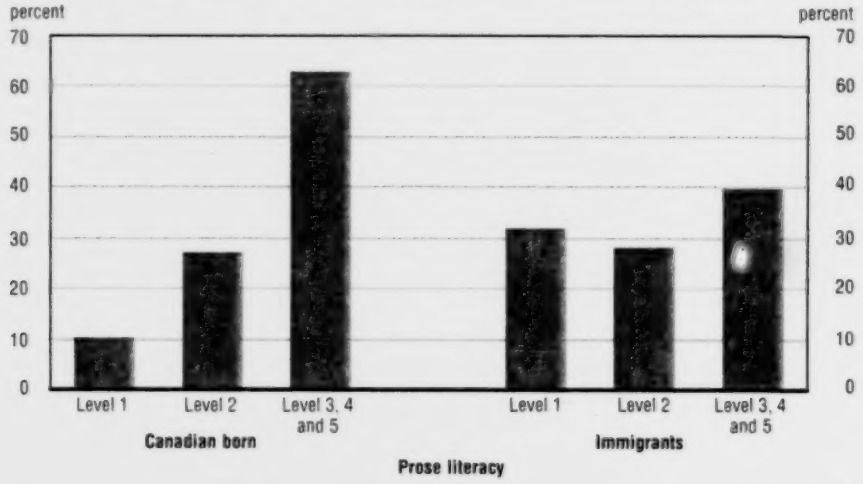
2.5 Immigrants

As indicated by Chart 2.5, 60 percent of immigrants performed below Level 3 on the prose scale, compared with 37 percent of their Canadian-born counterparts. Canada's average score (281 points) increased by 7 points to 288 points when the scores of immigrants were excluded. While the proportion of those who scored at Level 2 was similar for Canadian born and immigrants (27% and 28% respectively), those who were Canadian born were more likely to reside in the higher literacy levels (63% compared to 40% for immigrants) while immigrants were more likely to reside in the lowest literacy proficiency level (32% versus 10% for Canadians).

When examined by proficiency level (Chart 2.6), the proportion of immigrants within each proficiency level increases by level. For example, about 45 percent (representing 1.4 million persons) of those scoring at Level 1 on the prose literacy scale had immigrated to Canada (Chart 2.6). Among those scoring at Level 2, the proportion of immigrants was much smaller (21% or about 1.2 million persons), while 79 percent were Canadian born. The immigrant population accounted for only 14 percent of all those at the higher levels of the prose literacy scale. It should be noted that according to the 2001 Census, only 20 percent of the Canadian population aged 15 to 64 was of immigrant origin (Statistics Canada, 2003). Hence, immigrants represented a higher proportion at Level 1 and a lower proportion at Levels 3, 4 and 5 compared to their proportion in the population. Nonetheless, there were about three times more Canadian born (6.3 millions persons) with low literacy than immigrants (representing 2.6 million persons).

Chart 2.5

Distribution of Canadian born and immigrants, by prose proficiency levels, Canada excluding Territories, population aged 16 to 65, 2003

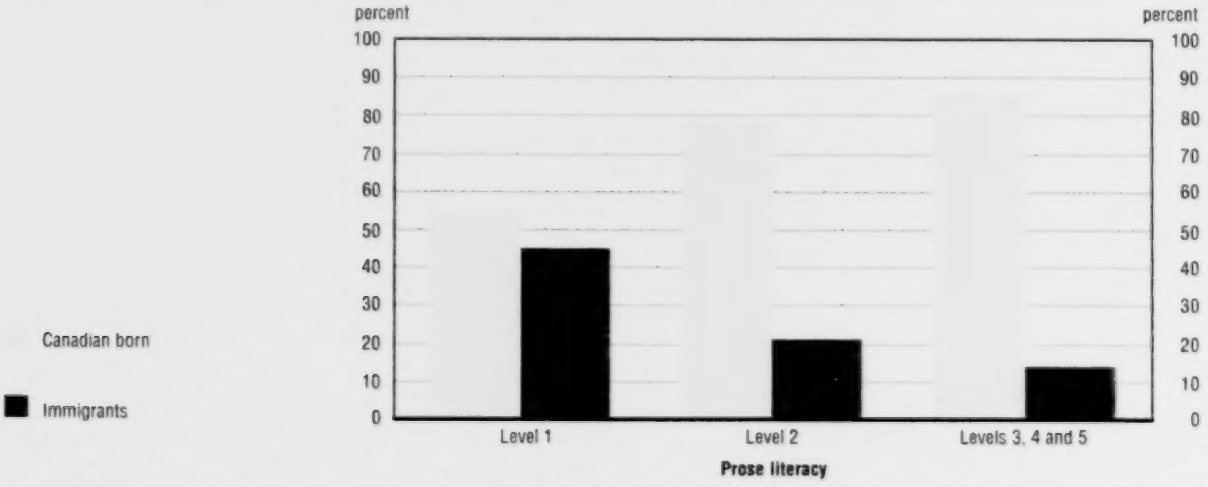


Note: See Table C.2.5 in Annex C.

The distribution of Canadians aged 16 to 65 by immigrant status is significantly different for those who were assessed in English or French at all prose literacy levels. Around 55 percent of immigrants assessed in English scored at Level 1 in prose literacy compared to 45 percent of the Canadian born. Among those assessed in French who scored at Level 1 proficiency, only 14 percent were immigrants compared to 86 percent Canadian born. Similarly, as shown in Chart 2.6, the distribution at Level 2 according to language of assessment showed that 27 percent of those assessed in English were immigrants and 73 percent were Canadian born.

Chart 2.6

Distribution of prose proficiency levels, by immigrant status, Canada excluding Territories, population aged 16 to 65, 2003

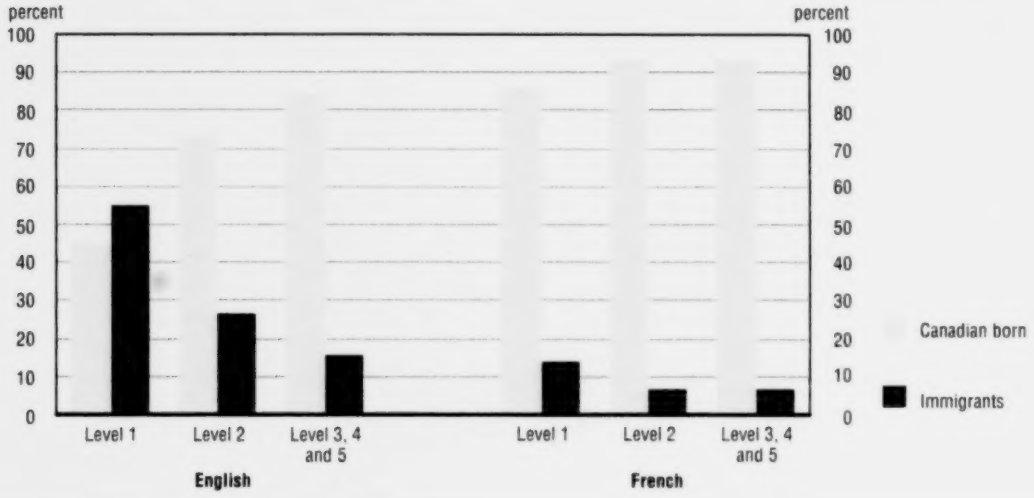


Note: See Table C.2.6 in Annex C.

Among those assessed in French, seven percent were immigrants and 93 percent were Canadian born (Chart 2.7). These differences among the distributions may reflect the choice of many immigrants to learn and use English rather than French depending on the province of residence. Among all immigrants, 92 percent (representing 4 million persons) took the test in English and eight percent were assessed in French (about 370,000 persons).

Chart 2.7

Distribution of prose proficiency levels, by language of assessment and immigrant status, Canada excluding Territories, population aged 16 to 65, 2003



Note: See Table C.2.7 in Annex C.

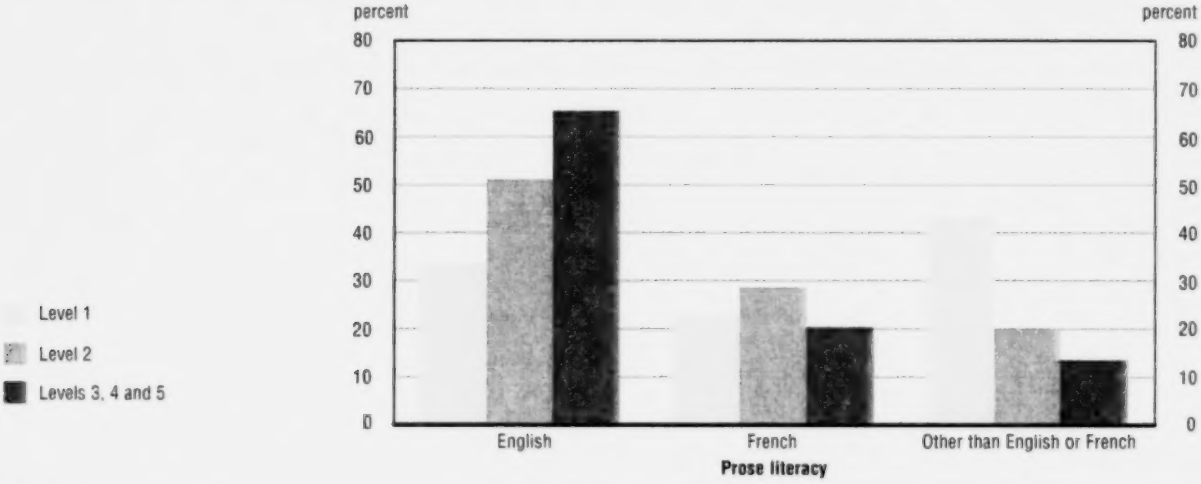
2.6 Mother tongue

The previous section showed that immigrants are more concentrated within the lower proficiency levels but this may in part be a reflection of their mother tongue: 74 percent of immigrants had a mother tongue other then English or French. And this proportion was higher among immigrants who took the test in English compared to those who took the test in French, 75 percent compared to 61 percent respectively.

The proportion of those with a mother tongue other than English or French decreased as proficiency level increased (Chart 2.8). Among Canadians performing at Level 1 in prose literacy, 43 percent had a mother tongue other than English or French while 34 and 23 percent reported speaking English and French respectively as their mother language. In contrast, at the highest level of proficiency (level 3, 4 and 5), only 14 percent had a mother tongue other than French or English while 65 and 20 percent reported English and French respectively as their mother tongue. (Chart 2.8).

Chart 2.8

Distribution of prose proficiency levels, by mother tongue, Canada excluding Territories, population aged 16 to 65, 2003



Note: See Table C.2.8 in Annex C.

Reflecting in part the high immigrant population among those evaluated in English who performed at lower literacy levels, the mother tongue distribution by language of assessment varied greatly. Among those assessed in English who performed at Level 1, 53 percent had a mother tongue other than English or French, while 44 percent had English and three percent had French or both English and French as mother tongue. In comparison, only 12 percent of those assessed in French at Level 1 had a mother tongue other than the two Canadian official languages. The largest proportion of people who performed at Level 1 (87%) and took the test in French were French native speakers (Table C.2.14).

At Level 2, 70 percent of those assessed in English were English native speakers compared to 26 percent who had language other than English or French. Among Canadians evaluated in French at this level, 93 percent had French as mother tongue and five percent had a mother tongue other than French and English.

At Level 3 and above, 81 percent of those who took the test in English were English native speakers; still 16 percent had a mother tongue other than English or French. Finally, the distribution of those assessed in French at Level 3 and above was not much different from the distribution of this group at Level 2; 93 percent spoke French and only four percent had a mother tongue different from French or English.

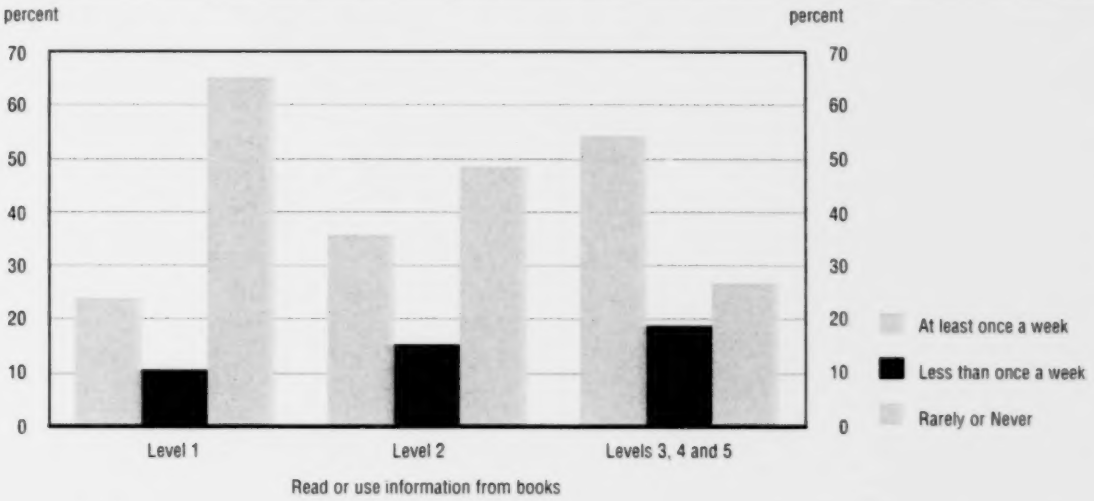
2.7 Frequency of reading books

Reading is of importance as it is crucial to being an informed citizen and to succeed in one's career. Good readers are able to understand sentences and the organizational structure of a written text. They can also comprehend ideas, follow arguments, and detect implications. Literacy proficiency has a direct impact on the capacity to read and understand the information presented in texts. In reverse, reading helps to strengthen literacy proficiency by building a strong and precise vocabulary. Among Canadians with prose proficiency at Level 1, 65 percent mentioned that they never

or rarely read books compared to 49 percent at proficiency Level 2; and only 27 percent at Levels 3, 4 and 5 combined. Comparatively, 54 percent of the latter reported reading at least once a week against 35 percent of those at proficiency Level 2 and 24 percent of those at Level 1.

Chart 2.9

Distribution of prose proficiency levels, by reading practices, Canada excluding Territories, population aged 16 to 65, 2003



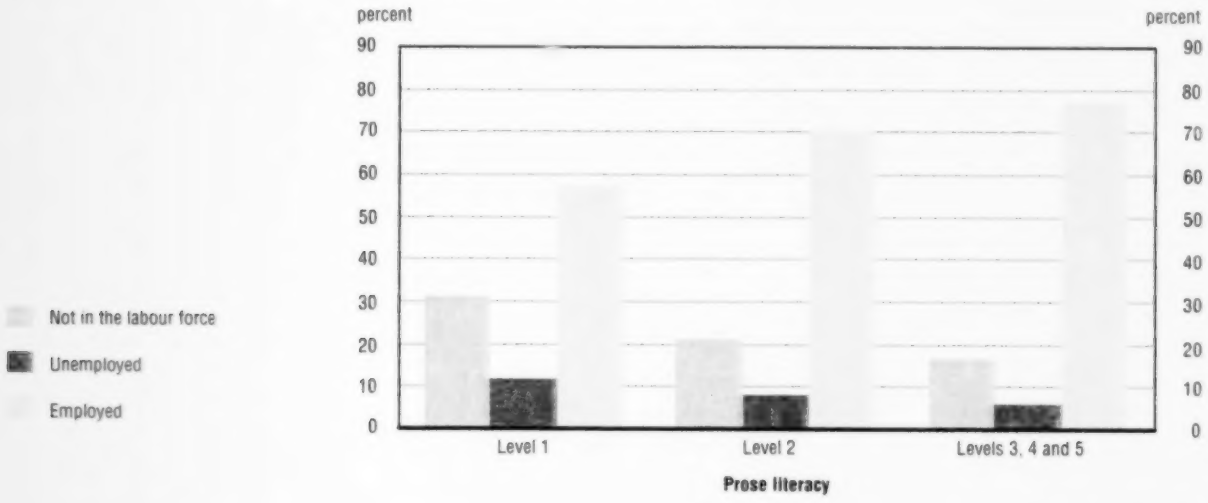
Note: See Table C.2.9 in Annex C.

2.8 Labour market status

A direct and clear link between literacy and employability is found in the data. As seen in Chart 2.10, although a large proportion of those with low prose literacy proficiency are active in the labour market, they represent a smaller proportion of those within the level 1 group compared to the proportion within the level 3,4 and 5 group. For example, nearly 57 percent (representing 1.8 million persons) of Canadians between the ages of 16 and 65 whose proficiency was Level 1 on the prose literacy scale were employed compared to 77 percent with Level 3, 4 and 5. In contrast, people who are not employed or not in the labour market are represented in a higher proportion within the level 1 group compared to level 3, 4 and 5, 31 percent (representing 970,000 people) versus 16 percent (or 360,000 Canadians) respectively in the level 1 group but half of these proportions at the level 3 and up so 16 and 6 percent.

Chart 2.10

Distribution of prose proficiency levels, by labour force status,
Canada excluding Territories, population aged 16 to 65, 2003



Note: See Table C.2.10 in Annex C.

With the exception of the unemployed, among whom six percent of those assessed in English scored at Level 3 or higher compared to four percent of those assessed in French, the differences between the levels of literacy according to language of assessment and labour force status were not significant (Table C.2.15).

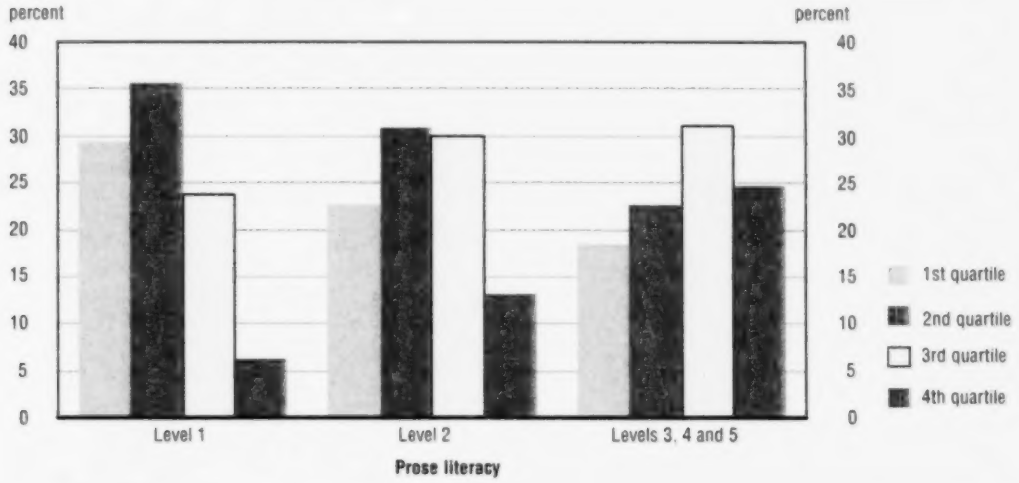
2.9 Literacy and income

A larger proportion (29%) of persons scoring at Level 1 on the prose scale had income in the bottom quartiles compared to 18 percent at higher levels of literacy.[1] At the higher literacy levels, 56 percent had income corresponding to the top two income quartiles, compared with 43 percent at Level 2 and only 30 percent at Level 1 (Chart 2.11).

1. Income quartiles were calculated using the total personal income in the year preceding the survey. Negative incomes were excluded from the calculation. Individuals were ranked on the basis of their total personal income from lowest to highest and then divided into four equal groups. Income quartile 1 include Canadians with income from CAN$0 to 8,000 dollars; quartile 2 includes income from $8,001 to $25,000; quartile 3 corresponds to the income range from $25,001 to $50,000; the fourth and highest income quartile includes income from $50,001 and up.

Chart 2.11

Distribution of prose proficiency levels, by income quartiles, Canada excluding Territories, population aged 16 to 65, 2003



Note: See Table C.2.11 in Annex C.

2.10 Conclusion

The foregoing analysis has compared the characteristics of working age Canadians performing at the lower literacy levels to those of their more proficient peers. In essence, individuals with low literacy skills were older, less educated, immigrants or had a mother tongue other than English or French. Low literacy affects labour market outcomes in a way that establishes a strong link between employability, income and literacy proficiency.

Specifically, the results presented in this chapter demonstrate that the immigrant population is highly over-represented in the bottom literacy levels (Levels 1 and 2). In fact, 45 percent of all Level 1 persons were immigrants, whereas the same group accounted for one fifth of Level 2 individuals. A somewhat higher percentage of men (53%) compared to women (47%) were at the two lowest levels of literacy proficiency but this difference is not statistically significant.

Low literacy levels are also more common for older Canadians. Individuals between the ages of 36 and 65 years were twice as likely to score at Level 1 proficiency than those aged 16 to 35 years. The proportions were somewhat different at Level 2, where 20 percent were aged 16 to 25 years compared to 16 percent who were between 56 and 65 years of age.

Since literacy is a foundational competency normally acquired through formal education, less educated persons accounted for a higher proportion of those with low literacy. Among those at the lowest level of proficiency, 50 percent had not completed high school, approximately 30 percent had completed high school and 20 percent had some post-secondary education. Among those with Level 2 proficiency, 27 percent had not completed high school, 37 percent had done so, and 35 percent had obtained some post-secondary education.

A relationship between literacy proficiency and labour market status was also established. Only 57 percent (1.8 million) of those with Level 1 prose literacy proficiency were employed compared to 70 percent (4.1 million) of those at proficiency Level 2 and 77 percent among those with proficiency at or above Level 3.

It is likely that the learning needs of those at lower levels of literacy are varied due to the different factors that are associated with their performance. The broad characterization of Canadian adults with low literacy offered in this chapter masks more complex reading profiles, with clusters of special learning needs or developmental challenges that influence their written and oral comprehension and, in turn, their literacy performance. The next chapter will examine the nature of these special learning needs and challenges in order to be able to analyze more customized responses to the specific conditions of different groups of Canadian adults.

Author

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Chapter 3

Theoretical considerations underlying the reading components

As mentioned in Chapter 1, one of the main goals of the ISRS is to describe in greater depth the reading abilities of society's least-skilled adult readers and to identify their basic reading profiles, based on their strengths and needs in reading. The ISRS has therefore focused on the components of reading that are the most important for adults in IALSS Levels 1 and 2. This chapter describes the theory underlying each component of reading that was assessed and discusses how each contributes to our understanding of the reading strengths and needs of IALSS Level 1 and 2 adults. The description of each component concludes with a brief discussion of instructional considerations. These are included to give the reader a general idea of how teachers and reading researchers might interpret each of the component tests.

3.1 Components of reading and reading development

The IALSS assessment measured reading proficiency using a variety of materials taken from real life, such as news stories, product warranties, editorials, written directions, charts and graphs, and bus schedules. For competent readers, using such materials is a seamless process – almost as if the print were talking to them. However, research with children and adults has shown that proficient reading depends on a number of sub-skills or components that take place – indeed, *must* take place – with little or no conscious effort or awareness on the part of the reader (Stanovich, 1986). For example, printed strings of letters on the page must be recognized and pronounced as words and meanings must be attached to them before a reader can comprehend a sentence, paragraph or longer text.

To identify areas of strength and need in reading, researchers and teachers have found it useful to deconstruct the reading process into its various underlying components or sub-skills. The underlying components of reading can be divided

into two general categories, *print components* and *meaning components*. *Print components* enable the reader to translate the written representations of words on the page into their spoken language equivalents. These skills include word analysis (or phonics), decoding (or word recognition), and fluency. *Meaning components* enable the reader to understand individual words, sentences, and entire texts. The most important meaning skill is knowledge of word meanings, or vocabulary. Closely related to vocabulary is possessing basic background knowledge in the content areas of social studies, literature, science, and mathematics, which most people acquire through formal schooling.

Researchers have found *print skills* and *meaning skills* together account for 80 percent of the variance in reading comprehension (Perfetti, 1985; Gough and Tunmer, 1986). If one can decode the words and know what they mean, one is likely to understand what is read. Fortunately, both *print skills* and *meaning skills* can be taught to adults and older adolescents who need to acquire them (Chall, 1994; Curtis and Longo, 1999). Although other factors such as knowledge of reading strategies, motivation, interest, and engagement also affect comprehension, among them only knowledge of strategies can be taught.[2]

3.2 Contrasting more-skilled and less-skilled adult readers

Among more-skilled readers, the components of reading work together rapidly and without conscious effort to allow successful reading comprehension to take place. How rapidly? Consider, for example, word recognition; this is the ability to recognize a string of letters as a word and produce its correct phonological representation in a kind of internal speech. Among skilled readers, word recognition takes place within 250 milliseconds for most words and even a bit faster for very familiar words (Ashby, 2006). Virtually simultaneously with word recognition, the meaning of the written word is accessed, as automatically as known words are quickly understood in spoken language (Adams, 1994). Because skilled readers access both the pronunciations and the meanings of most words so rapidly, effortlessly, and unconsciously, they are able to devote all of their mental energy to comprehension. This is what enables skilled readers to be active and thoughtful readers – to gain new information from print, to interpret and evaluate it, and to use that information to acquire or even create new knowledge.

Less-skilled readers present a number of sharp contrasts. First, many of them recognize words laboriously and unreliably. This causes them to pause frequently to sound-out words; in addition, they often must take time to re-read sentences and phrases to verify that they have recognized the words correctly. Unavoidably, this leads to very slow reading rates that adversely affect their comprehension (Perfetti, 1985; Stanovich, 1986). Slow reading rates make materials used in upper secondary school and above (like those in IALSS Levels 3, 4, and 5) especially difficult to comprehend. Texts at these higher levels usually contain longer and more complicated sentences that are harder to understand at slow reading rates. This is because for very slow readers, these longer phrases and clauses start to degrade in short-term memory. They become fuzzy before they can be "chunked" and subsequently

2. The ISRS did not measure participants' knowledge of reading comprehension strategies directly because it is difficult to do so reliably in large-scale household surveys that are subject to severe time constraints. Small-scale studies are usually employed to gather data on readers' use of strategies. A typical approach would be to ask participants to read somewhat lengthy texts from a variety of genres and to interview them at length about what strategies they used understand the various genres.

interpreted and integrated with the phrases and clauses that follow. To simulate this effect, imagine how difficult it would be to understand a newspaper article on foreign affairs, for example, if someone read it to you at one-fourth normal speed, at about only 40 to 50 words per minute, with occasional stumbles and repetitions.

Knowledge of word meanings or vocabulary is more obviously related to reading proficiency. Many less-skilled readers — and, this is true for both native speakers and new learners of a language – do not know the meanings of enough words to understand texts that are written above very basic levels. Their vocabulary knowledge is limited to the most common everyday conversational words. As a result, their understanding of what they read is often hazy at best. This makes it especially difficult for less-skilled readers to use reading to acquire new knowledge and new vocabulary. In concrete terms, they are less able to take advantage not just of formal educational opportunities like schooling; they are also less able to make use of informal and self-directed opportunities such as newspapers, educational television programs, public libraries, or the internet.

Limited vocabulary knowledge can also cause people to read very slowly. This is especially true for new learners of a language. They often take more time to access the meanings of the words they know, and they pause frequently to figure out the meanings of unfamiliar words or to parse unfamiliar grammar and syntax.

The relative contributions of the print components and meaning components to reading comprehension are not static; they change with the developing skill and ability of the reader. For example, print skills make a substantial contribution to the reading comprehension of young children, to adult beginning readers, and adults who read below middle-school levels. Because of the familiar content of basic reading material, if one can decode it, one can usually understand it. Less-skilled adults' limited ability to recognize words quickly and accurately prevents them from comprehending texts for which they happen to possess adequate vocabulary and background knowledge. More skilled adult readers, in contrast, have long ago mastered the print components of reading. Differences in their vocabulary and background knowledge play a determinative role in their comprehension rather than their highly developed print skills. So, for example, good readers could decode the words in a highly technical astrophysics journal, but unless they have knowledge of that field, they probably would not understand what they are reading.

3.3 The components assessed in the ISRS

The ISRS has focused on the components of reading that are the most important for adults in IALSS Levels 1 and 2 to master in order to progress to Level 3 and beyond; that is, the print components and basic vocabulary. The primary focus of the ISRS was not the reading of *all* Canadian adults. A study meant to describe the differences among all Canadian adults — including those at Levels 3, 4, and 5 — would at a minimum have required a wider and deeper assessment of vocabulary, as well as broad measures of background knowledge in content areas. Table 3.1 presents a summary overview of the reading components assessed in the ISRS.

Unless noted otherwise, all components were assessed in the language of each participant's choice, English or French. The French and English components tests were designed to be comparable in that they assess the same skills at approximately the same levels, but they were not designed to be equivalent to each other. Therefore, it should be stressed that we cannot conclude from the French and English scores on a given component that one group is more or less proficient than the other. First, as discussed earlier, differences between the French and English adult readers in the

ISRS are influenced by differences in the two populations. For example, as compared with the French test takers, the English test takers included a greater proportion of immigrants — and, especially of those who were not native speakers of English. In addition, differences between the two languages themselves probably affect the results. Research with French and English speaking children has found that because French spelling corresponds more closely to pronunciation than English spelling and pronunciation, French children usually become proficient at decoding — which is, after all, matching spelling and sounds — at a somewhat younger age than English children (Aro and Wimmer, 2003).

Table 3.1

Reading components assessed in the ISRS

Component	Test Name	Brief Task Description
Real word reading (English only)	Test of Word Reading Efficiency (TOWRE-A): Sight Word Efficiency Subtest (1999).	Reading as many words as possible from a list within a 60-second time limit.
Pseudo-word reading	Test of Word Reading Efficiency (TOWRE-B): Phonemic Decoding Efficiency Subtest (1999).	Reading as many pseudo-words as possible from list within a 60-second time limit.
Spelling	In Moats (1995), abridged by M.E. Curtis and J. Strucker with permission from the author.	A list of 15 words dictated in isolation, with an exemplar sentence for each word.
Vocabulary	Peabody Picture Vocabulary Test (1997), abridged by K. Yamamoto, with permission from the publisher. The test in French is "Évaluation en Image Peabody" (1993) ÉVIP abridged, with permission from the author.	Participant chooses which of four pictures presented on a single page best goes with the target word pronounced by the examiner.
Rapid Letter Naming	Rapid Automatized Naming (letters) (Wolf, 1997) *and* Scrambled Alphabet Naming (Strucker, Kirsch and Yamamoto, 2007)	Participant pronounces the names of letters presented on a card as fast as possible. Score is elapsed time in seconds to read all the letters on the card.
Short-term Memory (Digits Forward) Working Memory (Digits Backward)	Digit-Span Subtest from the Wechsler Adult Intelligence Scale III (1997)	Participant repeats increasingly longer sets of digits in the order pronounced by the examiner (Digits Forward). Participant repeats increasingly longer sets of digits in reverse of the order pronounced by the examiner (Digits Backward).

Note: The TOWER-A, TOWER-B and spelling tests were adapted by Canadian reading experts with permission of the authors. These adaptations are not commercialized.

In what follows, the description of each component concludes with a brief discussion of "Instructional considerations." These instructional considerations are included to give the reader a general idea of how adult literacy teachers and reading researchers might interpret each of the component tests used in the ISRS. However, the ISRS was not designed to provide specific recommendations as to which instructional approaches might work with the wide variety of Level 1 and Level 2 readers in Canada's French and English language communities.

3.4 Real word reading for accuracy and speed – English only

In the English language assessment participants were asked to read aloud a list of 104 words as fast as possible without making a mistake. The list began with familiar one-syllable words such as *go, dog, in,* and *at* and concluded with longer, less familiar three-syllable words such as *wilderness, grandiose, ornament,* and *penitent.* Scoring was based on the percentage of words read correctly within 60[3] seconds.

Unfortunately, the French language version of this test did not function as expected, and so its results did not contribute to our analysis of the French readers. In brief, the test did not distribute the participants sufficiently; too many were clustered at high levels of proficiency to permit making inferences about the relationship to the IALSS scales or to the other French components.[4] The discussion that follows, then, refers only to the English version of Real Word Reading.

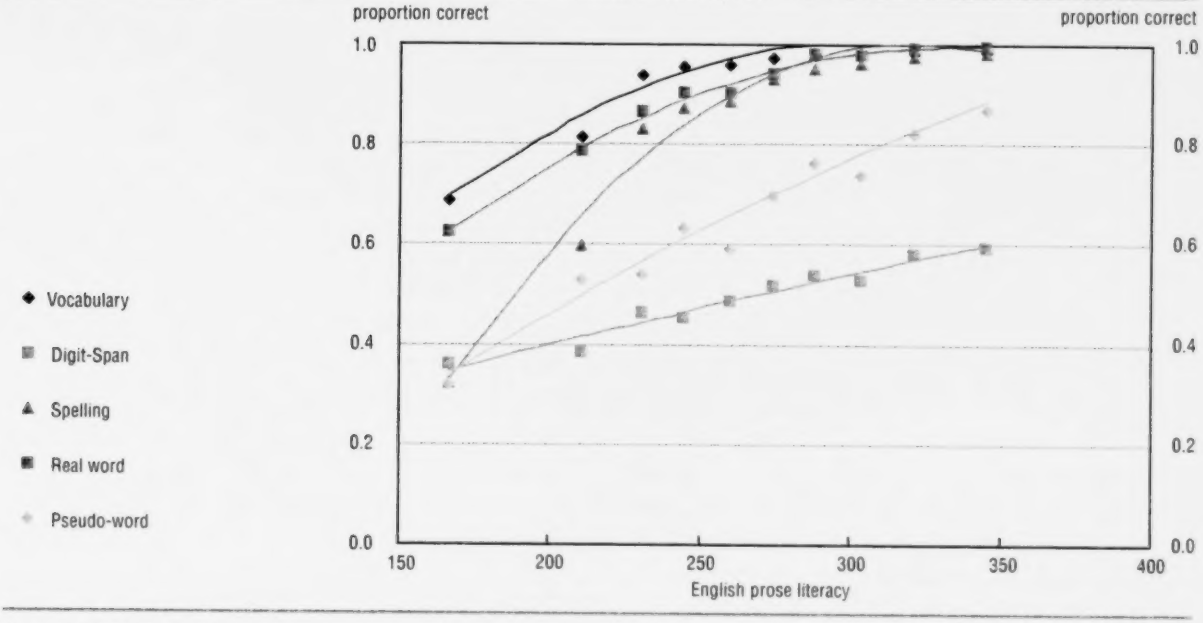
As noted previously, the quick and accurate word reading measured by this test is essential for efficient processing of text and effective comprehension.

- For the English reading participants, Real Word Reading was moderately-to-strongly correlated with IALSS prose literacy at .559 and IALSS document literacy at .527.
- Note that even though the IALSS prose and document tests were *untimed*, this speed-driven test of word reading was nevertheless moderately-to-strongly correlated with them. This suggests that having adequate reading speed is not primarily important for comprehension just because it enables you to finish timed standardized reading tests. The possession of adequate reading speed signifies that a reader is capable of the automatic processing of text that is required both for efficient comprehension of longer sentences and more complicated texts.
- As Chart 3.1 illustrates, participants in the lower ranges of Level 1 read only about 60 percent of the words correctly; those in mid-Level 1, about 75 percent of the words correctly, those in Level 2 about 85 percent of the words correctly; and those nearing Level 3 about 95 percent of the words correctly.[5]
- Note that Real Word Reading is notably weak among the latent classes[6] comprised primarily of IALSS Level 1 and Level 2 adults.

3. Although the published instructions for this test call for a 45-second time limit, a 60-second time limit was used in the ISRS to strengthen the analysis by allowing participants to provide additional responses.
4. A rigorous attempt was made to make the French and English word lists similar with regard to difficulty by attending to syllable structure and word frequency. However, too few French participants made enough errors for the test to be scaled. This meant that no interpretations were possible. It can neither be concluded, therefore, that the French test was "easier" than the English test nor that French participants generally perform "better" on this component.
5. All within the 60-second time limit.
6. The purpose of latent class analysis and the methods used in the ISRS are described in Chapter 4.

Chart 3.1

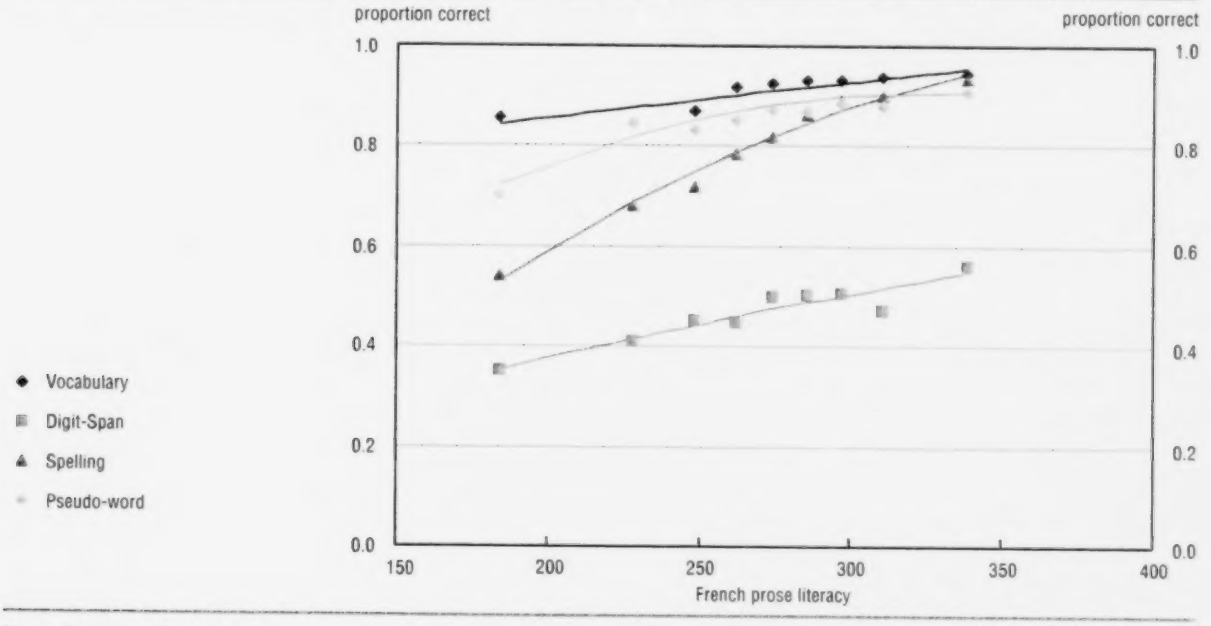
Line graph showing observed scores on each component by score on the IALSS prose scale, English, Canada excluding territories, population aged 16 to 65, 2005



Note: See Table C.3.1 in Annex C.

Chart 3.2

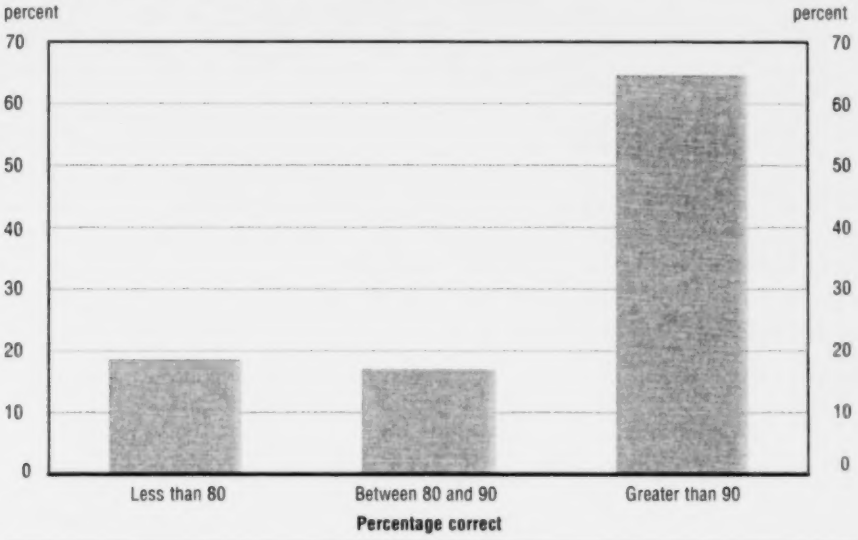
Line graph showing observed scores on each component by score on the IALSS prose scale, French, Canada excluding territories, population aged 16 to 65, 2005



Note: See Table C.3.2 in Annex C.

Chart 3.3

Population distribution by percentage of correct scores, Real Word Reading test, English, Canada excluding territories, population aged 16 to 65, 2005



Note: See Table C.3.3 in Annex C.

It can be seen from Chart 3.3 that the top 65 percent of the participants read 90 percent or more of the words correctly. It is likely that the Real Word Reading accuracy and reading rate of these adults is at least adequate for the purposes of attaining Level 3 IALSS literacy. If these adults do have any difficulties in reading, those difficulties probably lie in the areas of vocabulary and background knowledge. They may also be unfamiliar with certain kinds of more formal texts and comprehension strategies that are appropriate for those texts.

About 17 percent of participants are close to the top 50 percent in Real Word Reading: they were able to read about 80 percent or more of the words correctly within 60 seconds. If they were to enrol in adult education classes, many would have the potential to make relatively rapid improvement in this component, provided they were given opportunities to practice fluent reading at an appropriate level of challenge. Note, however, that like many other Level 1 and 2 readers, because they often lack formal education, they may also have difficulties in vocabulary and background knowledge that also limit their ability to reach IALSS Level 3.

The remaining 19 percent of the participants have much more limited Real Word Reading ability. Those at the upper end of this group could probably benefit from at least a review of basic phonics, which is also referred to as "alphabetics." Those at the bottom four percent of the sample were able to read fewer than half of the words correctly within 60 seconds. Some of these adults would need to be taught using a systematic approach to basic phonics. In addition, many adults in this category are new learners of English who have not yet acquired the basics of English phonics and word reading (Johansson *et al.*, 2000).

That only four percent of the English Level 1 and 2 participants have such extremely limited word reading ability is worth noting. When the public hears about the "problem of adult literacy," they often imagine that this means there are large numbers of adults who are almost complete non-readers, similar to people in poor

and developing countries. Yet the number of such readers in Canada, even counting those who are non-native speakers of English, is relatively small.[7] Much more numerous are those adults who *are* readers, but read words so slowly and inaccurately that they cannot tackle the challenging texts and documents at IALSS Level 3 and above.

Instructional considerations

Assuming that adults received reading instruction as children, they can still have persistent problems reading words rapidly and accurately for a variety of reasons. Some may have severe to moderate dyslexia, where dyslexia is defined as a neurologically-based difficulty in associating the sounds of spoken language with their visual symbols – letters and groups of letters (Bruck, 1990; 1992; Shaywitz, 1996). Even if they are highly motivated, dyslexic individuals usually do not "pick up" the print skills of reading just through exposure. This certainly does not mean that dyslexic adults cannot learn to read. But to do so they usually need direct, systematic, and sequential instruction in print skills by highly trained teachers. Even with the best teaching, progress for the most severely dyslexic adults can be painfully slow. Independent of their progress in learning to read, assistive technology, such as books on tape, can help these adults to "read" for pleasure and also to acquire content that they would have difficulty reading. Text-to-speech devices can also assist them with print they need to read but cannot decode reliably on their own.

Adults who are new learners of a language may not automatically know the English or French sound/symbol systems unless they receive explicit instruction in them. Just because an adult appears to be gaining speaking and listening ability in a new language does not necessarily mean that she or he can learn to read or write it with ease. If a new immigrant is highly literate in her native language, especially if that language is an alphabetic language with similar syllable structure to French and English, she may be able to intuit a good deal of the sound/symbol relationships of English or French on her own. However, even for these highly literate adults, attention to English or French print skills could speed up the learning process and enable them to use reading itself as a way to strengthen their oral language abilities in the new language.

Adults who are not literate or barely literate in their native languages usually require direct, systematic, and sequential instruction in the English or French sound symbol relationships. Since they are not proficient readers in their native languages, they often need extended opportunities to practice and integrate the components of reading, and they may also need exposure to the purposes and uses of literacy.

7. It is possible that four percent is somewhat of an underestimation because adults at this level tend to be somewhat "under-sampled" in household interview studies such as the ISRS. Their embarrassment about their reading ability can make them more reluctant to be interviewed and tested, and they can be more difficult to contact because they tend to move more frequently than other survey participants.

3.5 Pseudo-word reading for accuracy and speed

This test was administered similarly to the Real Word test: participants were asked to read aloud a list of 63 pseudo words as fast as possible without making a mistake. Pseudo-words are made-up words whose spellings and pronunciations correspond to the regularly occurring patterns of real French or real English words, respectively. The French list began with one-syllable pseudo-words like *di*, *ka*, *mys*, and *tou*, and it concluded with three-syllable pseudo-words such as *mélitanque*, *artemboute*, *citérand*, and *nolipeste*. The English list began with one-syllable pseudo-words such as *mo*, *ik*, *pu*, and *bi*, and it concluded with *morlingdon*, *revignuf*, *obsorfelm*, and *pitocrant*. As with Real Word Reading, scoring was based on the percentage of words read correctly within 60 seconds.

What does pseudo-word reading tell us? Because the reader is encountering each pseudo-word for the first time, he must use his knowledge of the sound/symbol correspondences of French or English to come up with plausible pronunciations. In this sense, it is a test of one's phonics knowledge or one's raw phonemic decoding power. For younger readers or for adults who have limited literacy, the test reveals how well they are acquiring the basic phonics of their written language.

For those at higher levels of reading skill, pseudo-word reading tells a somewhat different story. Adult literacy teachers regularly work with adults who can read real words adequately, but who nevertheless struggle quite a bit with pseudo-words. In some cases these learners turn out to have had reading difficulties in childhood that were partly addressed by good instruction. But their difficulties with pseudo-words persist as a sign of their underlying problems with sound/symbol relationships. These individuals are also often poor spellers. The message for teachers is that these adults will not find it easy to learn the pronunciations of new words or to remember them. They may need more practice with a new words or syllable patterns before they can recognize them automatically in subsequent encounters. Such learners also tend to spell at levels that are far below what would be expected for their level of reading comprehension.

Proficient readers are able to read pseudo-words almost as rapidly as they read real words. These individuals tend to be strong in all aspects of reading, including spelling. They also tend to have read a great deal in the course of their lives. Through their extensive reading, they have encountered so many real words and encountered them so often that they have been able to internalize the recurring syllable patterns of French or English. They pronounce the pseudo-word syllables by making instant analogies to the real word syllables they have learned so well.

- For the French reading participants, Pseudo-Word Reading was moderately correlated with IALSS prose literacy at 0.412 and IALSS document literacy at 0.398.
- For the English reading participants, Pseudo-Word Reading was moderately-to-strongly correlated with IALSS Prose Literacy at 0.558 and IALSS Document Literacy at 0.535.
- As Chart 3.1 illustrates, English reading participants in the lower ranges of IALSS Level 1 read only about 33 percent of the pseudo-words correctly; those in mid-Level 1, about 50 percent of the words correctly, those in Level 2 about 65 percent correctly, and those nearing Level 3 about 70 percent of the words correctly.

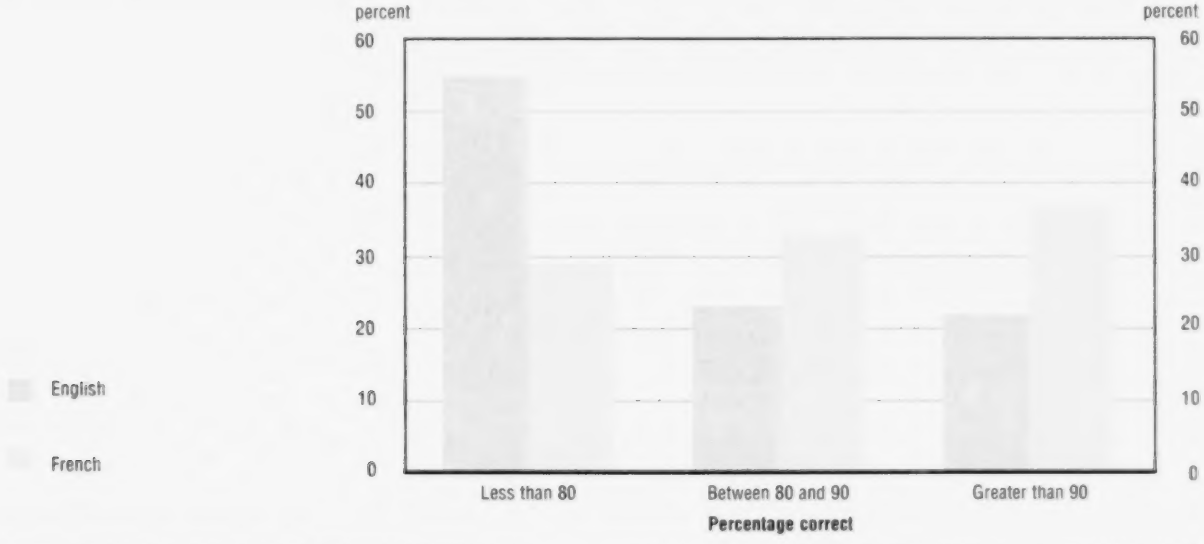
- As Chart 3.2 illustrates, French reading participants in IALSS Level 1 read only about 70 percent of the pseudo-words correctly; those in mid-Level 2, about 85 percent of the words correctly, and those nearing Level 3 about 90 percent of the words correctly.
- Note that Pseudo-Word Reading is a particularly weak component among both French and English latent classes that are comprised primarily of IALSS Level 1 and Level 2 adults.

A cursory examination of the results displayed in Chart 3.4 for English Pseudo-Words shows that this test is more difficult than Real Word Reading for the English readers. While 50 percent of the English readers were able to read 90 percent or more of the Real Words correctly, only 22 percent of the English readers were able to read 90 percent or more of the pseudo-words correctly. As discussed earlier, French readers were so uniformly strong in Real Word reading that those results could not be interpreted. But like the English readers, they also found Pseudo-Word reading somewhat difficult, with only about 37 percent of them able to read 90 percent or more of the Pseudo-Words correctly. About 23 percent of the English and 33 percent of the French participants read 80 to 90 percent of the pseudo-words correctly. To further illustrate the challenge posed by pseudo-words, over half of the participants in English and over one third in French read fewer than 80 percent of the words correctly within 60 seconds.

At the lowest levels of skills on this test, four percent of the French and 15 percent of the English participants were only able to read 50 percent or fewer of the words correctly. As discussed above, it is likely that many of the adults with this extremely limited proficiency in Pseudo-Word reading have difficulty sounding out unfamiliar words and difficulty with spelling.

Chart 3.4

Population distribution by percentage of correct scores, Pseudo-word Reading test, English and French, Canada excluding territories, population aged 16 to 65, 2005



Note: See Table C.3.4 in Annex C.

Instructional considerations

Among adults, severe difficulty with Pseudo-Word Reading and severe difficulty with Real Word Reading can indicate a reading disability — from moderate to severe. Teachers working with adult beginning readers in university-based clinics (Bruck, 1990; 1992) often use pseudo-word tests to identify which phonics principles learners know and which they need to be taught. Adult beginning readers often possess a small store of real words that they have memorized, like *name* or *car*, but this does not necessarily mean that they are able to read analogous lower-frequency words like *fame* or *tar*.

As touched upon above, some adult learners appear to read real words with apparently adequate rate and accuracy, but nevertheless struggle to read pseudo-words. Teachers observe that these learners often read connected text a bit more slowly and with more minor errors than other learners, they spell poorly, and they usually take longer to decode unfamiliar real words that they encounter in reading.

Interestingly, many non-native speakers who are already literate in another alphabetic language are able to read English or French pseudo-words almost as easily as they read real words. Perhaps this is because for non-native speakers, all words in a new language are "pseudo-words" until they learn their meanings. These non-native speakers have already mastered the principle of alphabetic decoding in their native languages. Alphabetic decoding is their "default setting" for reading any unfamiliar word, so they automatically apply it with equal diligence to real words and pseudo-words alike.

Of course, adult literacy teachers would not normally teach pseudo-words, for what would be the point? Instead they teach learners how to recognize and decode the different patterns that occur among real words, although some teachers occasionally use pseudo-word exercises to determine whether learners have thoroughly mastered a given phonics principle.

As noted above, although more skilled readers, such as those at Level 3 and above find pseudo-word reading challenging, they are still able to read them almost as well as they read real words. Their skill with pseudo-words is at least partly the by-product of their having read a great deal more than Level 1 and 2 readers.

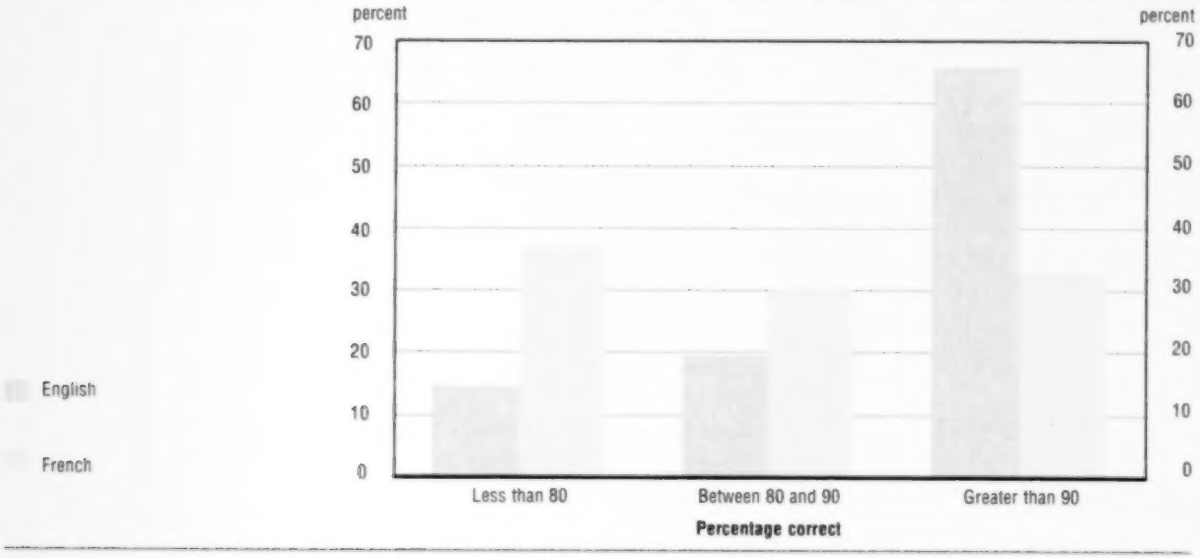
3.6 Spelling for accuracy

Spelling is often called "encoding" because the process of spelling involves translating the sounds of a word that is spoken aloud (during dictation) or produced in inner speech (as when we write) into the visible written code made up of the letters. In this sense, *encoding* is the flip side of word reading or *decoding*. Spelling was included among the ISRS components mainly to provide additional information about groups of adults who have difficulties decoding, especially the basic sound/symbol relationships of French and English. As Chart 3.5 illustrates, French test takers found the French spelling test a bit more difficult than English test takers found the English test.

About 32 percent of the French participants compared with 65 percent of the English participants had 100 percent of the Spelling items correct. Thirty percent of the French and 20 percent of the English spelled 80 to 90 percent of the words correctly, and 37 percent of the French and 14 percent of the English spelled 80 percent or fewer of the words correctly. The most challenging words on both tests were only at about middle-school level. The English test, for example, began with words such as *dig* and *rope*, and ended with *distance*, *confusion*, and *visible*.

Chart 3.5

Population distribution by percentage of correct scores, Spelling test, English and French, Canada excluding territories, population aged 16 to 65, 2005



Note: See Table C.3.5 in Annex C.

As expected, there were moderately strong correlations between Real Word Reading and Spelling and Pseudo-Word Reading and Spelling among both English and French readers. Table 3.2 presents the correlation coefficients.

Table 3.2

Correlation coefficients, Real word and Pseudo-word Reading test and Spelling test, English and French, Canada excluding territories, population aged 16 to 65, 2005

	English spelling	French spelling
	coefficient of correlation	
Real word reading	0.624	...
Pseudo-word reading	0.654	0.544

... not applicable

Table 3.3 reveals that, somewhat surprisingly, spelling ability was more strongly related to IALSS prose and document literacy – reading comprehension – than it was to any other component tested.

Table 3.3

Correlation coefficients, Spelling test and IALSS prose and document literacy scales, English and French, Canada excluding territories, population aged 16 to 65, 2005

	English spelling	French spelling
	coefficient of correlation	
IALSS Prose	0.830	0.737
IALSS Document	0.780	0.705

Why is spelling ability so strongly related to reading comprehension in the ISRS population? Perhaps the answer begins with the orthographies, or spelling systems, of both English and French. Neither English nor French is as easy to spell as, for example, Spanish. Spanish is said to have a relatively "transparent orthography," in that there is a close and highly predictable relationship between the sounds of the language and the letters and groups of letters. In Spanish, to a much greater extent than English or French, "Anything you can say, you can spell."

In contrast with Spanish, French and English have many unpronounced syllables and letters. In addition, English has many ways of spelling the same sound, sometimes depending on whether the word came from Anglo-Saxon roots or from Latin via Norman French, or simply whether the sound occurs at the beginning, middle, or end of a word. To spell English correctly, it helps to know more than just how a word sounds because one may need to know its meaning, its role in the sentence, and what other words it is related to (Chomsky and Halle, 1968).

More-skilled readers of French and English tend to be more-skilled spellers for many reasons. First, more-skilled readers read a great deal more than non-skilled readers (by a factor of 10 or more), so skilled readers have far more exposure to and practice with the variability of English and French spelling patterns than less-skilled readers. Second, by definition, more-skilled readers usually have more extensive vocabularies – also in large part because they read more. For example, with homophones like *bread/bred*, their vocabulary knowledge helps them to make more accurate decisions about a word's spelling in context than less-skilled readers (Adams, 1994).

To summarize, spelling ability embodies many of the same underlying skills as reading comprehension itself – phonological ability, word recognition, and vocabulary knowledge (Hodges, 1982). Moreover, like reading comprehension, spelling ability is also developed by extensive reading. To be sure, spelling ability is also developed and taught in school, but it is also a by-product of skilled reading.

- Despite the rather basic level of the French and English Spelling lists, as the results in Charts 3.1 and 3.2 show, both French and English participants in IALSS Level 1 had great difficulty with the assessment. French Level 1 participants averaged only about 50 percent correct, and English Level 1 participants only a bit above 40 percent correct. As discussed above, their difficulties with basic spelling are probably the flipside of their basic decoding difficulties.
- Interestingly, the spelling test was also challenging for the Level 2 adults: with the French participants at the level averaging 70 to 80 percent correct (11-12 items correct out of 15) and the English participants averaging 80 to 85 percent correct (12-13 items correct out of 15).
- It is only at IALSS Level 3 that most of the French or English participants all or nearly all of the words spelled correctly.

Instructional considerations

Since much of spelling ability is a by-product of reading ability, despite the high correlations with IALSS literacy, over-emphasizing spelling is probably not a shortcut to improving reading comprehension for less-skilled adults. Nevertheless, spelling can play an important role in instruction for both beginning and intermediate adult readers. Teachers of beginning adult readers often ask learners to practice spelling the words they are learning to read as part of their phonics instruction to reinforce

their mastery of the letter and syllable patterns. Teachers of intermediate adult readers often include spelling as part of the "structural analysis" of the multi-syllable words that are being studied for decoding or vocabulary. Structural analysis draws students' attention to prefixes and suffixes, Latin and Greek roots, and the frequently occurring syllable types (i.e., spelling patterns) in French and English, respectively.

It is tempting to downplay the long-term importance of spelling for adult learners, given the ready availability of computer spell-checkers. But the least-skilled adult spellers are often anxious and embarrassed about their bad spelling in everyday situations, such as filling out forms in the doctor's office or writing brief reports and emails in the workplace. These adults can usually find ways to mask their reading difficulties, but poor spelling can't be hidden as easily. Even modest gains in spelling ability can be quite meaningful for these adults.

3.7 Vocabulary

The ISRS used short versions in French and English of the Peabody Picture Vocabulary Test (PPVT) (Dunn and Dunn, 1997), with the permission of the authors.[8] The test is a test of receptive vocabulary that works as follows. The participant is shown a page containing four line drawings labelled 1, 2, 3, and 4, and the examiner pronounces the target word, either a noun (e.g., "camp") or a gerund (e.g., "swimming"). The participant is asked which picture – 1, 2, 3, or 4 – best goes with the word. The 57-item test begins with basic level words and the words gradually become more challenging. In addition, as the test goes on, some of the picture choices become more challenging, calling upon the participant to make finer distinctions among them, or to have a somewhat deeper or more extended knowledge of a word in order to choose the correct response. There is only one correct response for each item, and testing was discontinued after eight consecutive incorrect responses.

Note that the ISRS Vocabulary French and English tests require no reading or writing on the part of the participants. It is important to use oral rather than written vocabulary tests with less-skilled readers such as IALSS Level 1 and 2 adults because, as discussed above, many of them have difficulties with the print components of reading. If written vocabulary tests are used with less-skilled readers, it is impossible to tell whether participants got a given vocabulary item wrong because they genuinely did not know the meaning of the target word, or because they did not decode the question or the answer choices correctly.

Items at the most basic level in the English test included familiar words such as *sawing* and *farm*, and at the most difficult level words such as *oasis* and *confiding*. Items at the most basic French level included familiar words such as *coller* and *gonflé*, and at the most difficult level, words such as *mercantile* and *obélisque*. As frame of reference, the most difficult words on the shortened ISRS Vocabulary tests usually occur at just above high school level on the full-length assessments.

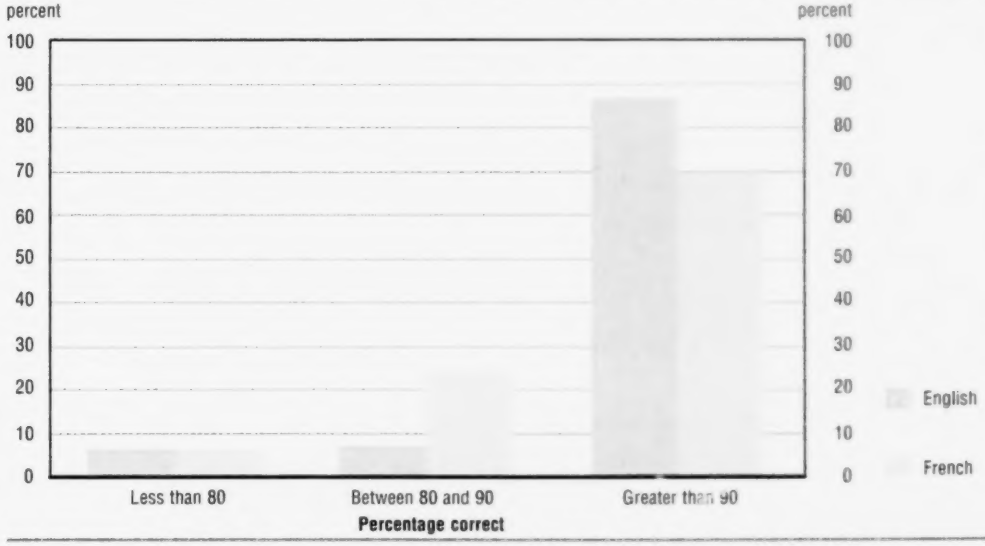
8. Kentaro Yamamoto of ETS created the short version of the PPVT by analyzing individual item responses to the full PPVT from 955 US adult learners who participated in a study by Davidson and Strucker (2002). In terms of education and background characteristics, the adult learners in the study generally resembled IALSS Level 1 and 2 participants. By deleting several of the easiest and several of the most difficult item sets and by skipping every other item among the remaining middle sets, Yamamoto found that 97percent of the variance of the full PPVT could be captured. The virtue of the abbreviated test is that it is easier to administer in the field and takes about one-half the time of the full test. The French vocabulary test was based on the short English version created and constructed in a similar manner.

- For the French reading participants, Vocabulary was correlated moderately strongly with IALSS prose literacy at 0.542 and IALSS document literacy at 0.596.
- For the English reading participants, Vocabulary was also correlated in this range with IALSS prose literacy at 0.599 and IALSS document literacy at 0.591.
- As Chart 3.1 illustrates, English reading participants in the lower ranges of IALSS Level 1 responded correctly to about 70 percent of the Vocabulary items correctly; those in mid-Level 1, about 80 percent of the items correctly, those in Level 2 about 90 to 95 percent of the items correctly, and those in Level 3 and above approaching 100 percent correctly.
- As Chart 3.2 illustrates, French reading participants in IALSS Level 1 responded correctly to about 85 percent of the Vocabulary items correctly; those in mid-Level 2, about 90 percent of the items correctly, and those nearing Level 3 about 93 percent of the items correctly.
- The curves for the French and English Vocabulary tests have somewhat different shapes: the French curve starts high at above 80 percent correct and slopes gradually upward toward 95 percent, whereas the English curve starts lower, at only 70 percent correct, but rises more steeply toward asymptote at 275 points on the IALSS scale (see Charts 3.1 and 3.2).

Bearing in mind that the French and English vocabulary tests were designed to be similar, but not equivalent, valid conclusions about this difference cannot be drawn. However, it is known that the English test takers included a much higher percentage of immigrants who were not native speakers of English as compared to the percentage of French test takers who were not native speakers of French. As expected, many of those with fewer than 80 percent correct on the English vocabulary were indeed non-native speakers of English who had not acquired these word meanings.

Chart 3.6

Population distribution by percentage of correct scores, Vocabulary test, English and French, Canada excluding territories, population aged 16 to 65, 2005



Note: See Table C.3.6 in Annex C.

About 85 percent of the English-speaking participants and 70 percent of the French-speaking participants had had 90 percent or more of the vocabulary items correct (Chart 3.6). About seven percent of the English and 23 percent of the French were proficient at the 80-90 percent correct level, with about six percent of both groups answering 80 percent or fewer of the items correctly.

Charts 3.1 and 3.2 show that the 80 percent of French and English participants who performed at the 85 percent correct or above level on Vocabulary, were primarily in IALSS Prose Level 2 and above. The remaining 20 percent of the French and English participants – those who performed below 85 percent correct in Vocabulary – were primarily IALSS Level 1. The English participants who ranged below 70 percent correct in Vocabulary include many adults who are non-native speakers and new learners of English.

Instructional considerations

The Vocabulary assessments in French and English are useful for identifying groups of adults with limited *breadth* of vocabulary knowledge, where breadth applies to the number of words known. Speaking in the broadest terms, adults with fewer than 85 percent correct on this relatively easy test need to learn more words at the high school level. But this is not an easy task, nor one that can take place quickly. Most adults who possess high school levels of vocabulary knowledge have acquired that knowledge over many years of studying and reading about history, science, literature, and art in school.

Although the ISRS Vocabulary tests were not designed to assess it, there is an additional area of concern regarding vocabulary – *depth* of word knowledge. Extensive research among children and adults has shown individuals who have limited *breadth* of vocabulary knowledge (such as measured on the ISRS Vocabulary) also tend to have limited *depth* of knowledge of the words they already know. Both factors – limited breadth and limited depth of vocabulary knowledge – adversely affect proficiency in reading comprehension (McKeown & Curtis, 1987).

Less skilled readers not only have difficulties with content-specific words such as the so-called "brick words" like *photosynthesis* or *bicameral*, they also have difficulties with the so-called "Tier 2" or "mortar words" that cut across academic disciplines and create associations between and among the "brick words" (Curtis and Longo, 1999; Beck, McKeown and Kucan, 2003). The word *norm* is an example of a "mortar" word, and *bicameral* is an example of a "brick word" in this sentence: *Bicameral legislatures are the norm in countries that trace their political traditions to Great Britain.*

3.8 Scrambled alphabet, rapid letter naming and Digit-Span

As expected, most adults in the ISRS performed well on these three tests. Rapid Letter Naming and Digit-Span were included in order to estimate the numbers of adults who perform so poorly on the tests that their abilities to learn to read, to read fluently at an acceptable rate, and to comprehend what they read are severely impaired. In interpreting the results of these tests, we are primarily concerned about adults who perform well below the 10th percentile.

For this Scrambled Alphabet assessment, participants were presented with a card on which the scrambled letters of the alphabet were printed in lower-case 36-point type. They were asked to say the names of the letters as quickly as possible without making a mistake, and their time was recorded in seconds. For Rapid Letter

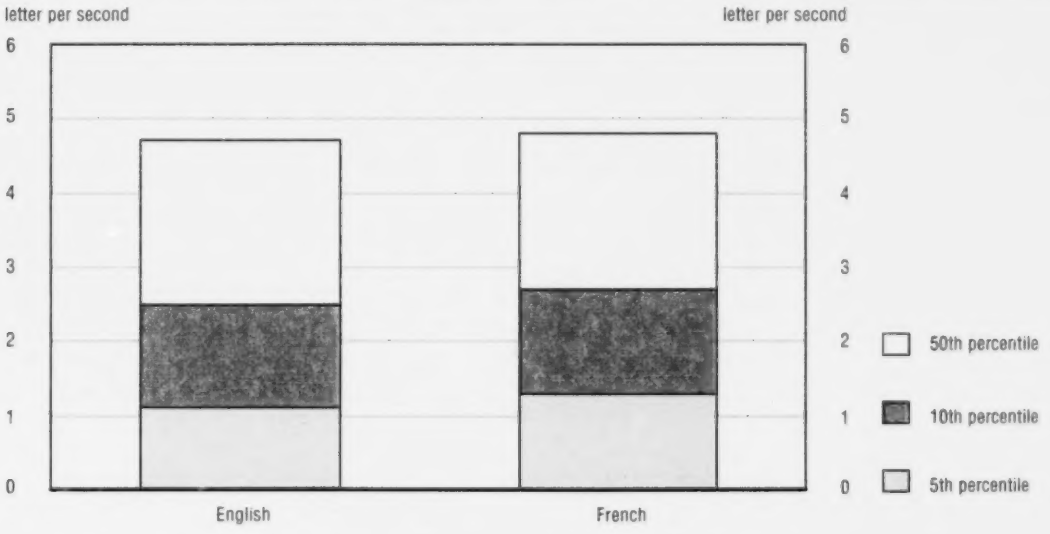
Naming, the letters *o*, *a*, *s*, *d*, and *p* were printed in 36-point type randomly arranged in five rows of ten letters each on a card, and participants were asked to say the names of the letters as fast as possible without making a mistake.

Since virtually all of the adults in this study were able to name the letters accurately, the speed measure letters-per-second was analyzed instead of proportion correct. Previous rapid naming studies of children and adults have consistently demonstrated the relationship of the rate of rapid naming to reading ability (Felton, Naylor and Wood, 1990; Misra *et al.*, 2004; Wolf *et al.*, 2003). Studies have shown that the small number of people who are very slow at this skill – i.e., those below the 10th percentile – may have a neurologically based predisposition to process written symbols very slowly. This slow processing can present added difficulty in learning to read because instant and accurate letter recognition is critical for efficient reading in alphabetic languages (Adams, 1994). In addition, rapid naming assessments can identify some adults who are already readers, but who read very slowly, even when they are reading material that is not difficult for them to decode. In summary, the Scrambled Alphabet and Rapid Letter Naming tasks, along with other information, can be useful in identifying how many adults, especially those in IALSS Level 1, may have this additional risk factor for reading difficulties (Harrison and Nichols, 2005).

On the chart each participant's responses from both of the rapid naming tasks were combined and expressed as a factor rate of letters-per-second. In both the French and English populations, participants at the 50th percentile pronounced the letter names at the rate of 2.5 letters per second or faster, contrasted with participants at the 10th percentile at who averaged 1.2 to 2.5 letters-per-second and those at the 5th percentile who averaged at 1.1 or fewer letters-per-second.

Chart 3.7

Population percentile distribution, factor rate of letters-per-second, English and French, Canada excluding territories, population aged 16 to 65, 2005



Note: See Table C.3.7 in Annex C.

It is likely some of the adults below the 10th percentile on the latter naming tasks were non-native speakers who had not yet learned the English or French letter names very well. Therefore, until they have the opportunity to learn the letter names, conclusions about their processing speed abilities cannot be drawn. On the other hand, the native speakers of French and English at this level are likely to include people with processing speed difficulties that may have instructional implications.

Instructional considerations

Although there are no hard and fast rules regarding this assessment, reading clinicians tend to be concerned about children and adults in the 10th percentile and below on rapid naming tasks. If they are beginning readers, such adults usually require a slower pace and more repetition and practice than other beginners. At intermediate levels these adults tend to read more slowly than expected, even when reading texts that contain words they can easily identify. Sometimes it is more difficult for them to increase their reading rate than it is for others at a similar level. Finally, when teachers are presenting new vocabulary words, these learners may require more exposure to the words and their meanings and more opportunities to say them and use them in context than other learners at a similar level.

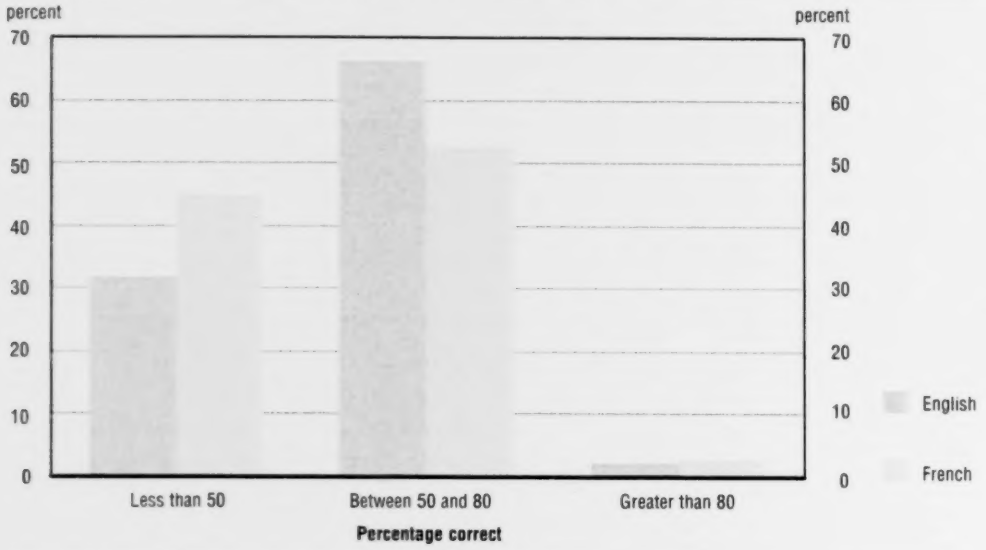
3.9 Short term memory and working memory

Like the Scrambled Alphabet and Letter Naming tasks, Digit-Span was used in the ISRS to help identify adults in IALSS Level 1 who may experience additional difficulties that can affect learning to read, or affect the rate at which they can improve their reading. Digit-Span is made up of two different tests for which the combined scores have been used in this study. In digits forward, participants are asked to repeat back increasingly longer strings of digits that are presented orally at one-second intervals. It is considered to be a test of *short-term memory*. Digits backward is a more challenging task, because participants are asked to repeat increasingly longer strings of digits *backwards*. It is considered to be a test of *working memory* because the participant must do two things at once – retain the orally presented digits in memory while rearranging and repeating them in reverse.

As a rule of thumb, reading teachers and clinicians have found that learners who have difficulty repeating more than four digits forward and three digits backward (approximately the 10th percentile for the ISRS French and English respondents) may have short-term and working memory problems that could adversely affect reading. For example, when learning to decode words, they may have difficulty holding the letter sounds that make up a word in short-term memory long enough or accurately enough to blend those sounds into a complete word; e.g., to blend the sounds */b/ /l/ /e/ /n/ /d/* to make the complete word *blend*. As expected, participants with this level of extremely limited short-term and working memory tend to be concentrated in the lower part of IALSS Level 1, from 225 points down to below 175 points. Referring to Chart 3.8, reading teachers would be especially concerned about the short-term memory of adults who had fewer than 20 percent correct, at most only a small percentage of the overall adult population.

Chart 3.8

Population distribution by percentage of correct scores, Digit-Span test, English and French, Canada excluding territories, population aged 16 to 65, 2005



Note: See Table C.3.8 in Annex C.

Even after learners with short-term and working memory problems learn to read at basic levels, they nevertheless tend to read slowly and laboriously. Their slow reading places a greater burden on their short-term and working memory and leads to impaired comprehension because they may have difficulty holding the memory of meaning-bearing phrases in the first half of a sentence in memory long enough to chunk them into a kernel of meaning and integrate that kernel with the information occurring in the last half of a sentence (Perfetti, 1985). Although improving reading rate and fluency are important for all readers in IALSS Level 1, it is especially urgent for learners with severe short-term and working memory problems to be able to do so.

Digit-Span correlates at a moderately high level with IALSS prose literacy (0.612 French; 0.694 English) and at a moderate level with French Spelling (0.48) and a moderately high level with English Spelling (0.58). This suggests, not surprisingly, that short-term and working memory support many higher-level aspects of written language comprehension and production. Finally, Digit-Span in French or English is not a reliable indicator of short-term or working memory for people who are just beginning to learn those languages. Digit-Span represents a daunting enough challenge in one's native language! Therefore, immigrants who are new learners of English and French are excluded from the analysis of this assessment.

Instructional considerations

Although they make up a very small percentage of the overall population, adults with severely limited short-term memory (either inherited or the result of head injuries or strokes) are over-represented in beginning reading classes. Reading teachers and clinicians have found that these learners present special challenges; they need careful and sequential teaching of phonics, usually presented at a slower pace, and they need

ample opportunities for practice and review. Once they begin to read, special effort should be made to improve their fluency and rate, beginning with basic and familiar material. To aid their comprehension of what they read, they may need to develop strategies of explicit self-questioning, recall, and note-taking to make sure they are retaining and understanding what they read, even down at the sentence level.

3.10 Conclusion

That only four percent of the English Level 1 and 2 participants have extremely limited word reading ability is worth noting. When the public hears about the "problem of adult literacy," they often imagine that this means there are large numbers of adults who are almost complete non-readers, similar to people in poor and developing countries. Yet the number of such readers in Canada, even counting those who are non-native speakers of English, is relatively small. Much more numerous are those adults who *are* readers, but read words so slowly and inaccurately that they cannot tackle the challenging texts and documents at IALSS Level 3 and above.

With regard to educational considerations, the results of the components assessments in the ISRS suggest that adult literacy practitioners would do well to explore the underlying causes of poor reading comprehension among Level 1 and Level 2 adult learners. In addition to focusing on techniques for improving reading comprehension itself, researchers and practitioners should also focus on how to help learners improve their word reading skills and vocabulary knowledge. As with all adult literacy instruction, the challenge is to discover ways to help learners achieve *accelerated growth* in these components; spending a calendar year to achieve a year's growth in skills for these adults can make it difficult for them to catch up.

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Chapter 4

The relationship between reading components and literacy proficiency

The proficiency levels used in reporting and interpreting scores on the IALSS prose and document literacy scales are empirically well defined in terms of the reading strategies that underlie them. However, the more general language and reading component skills that are associated with these proficiency levels have not been described in detail for national populations in either of Canada's official languages. This chapter analyzes the relationship between each of the reading components, described previously in Chapter 3, and the IALSS literacy levels. The results are presented in both charts and tables, with the numbers in parentheses indicating the standard errors of the estimates.

4.1 Reading components and literacy scores

As charts 4.1 and 4.2 show, the reading components or literacy sub-skills assessed in the ISRS show a consistent relationship with the IALSS prose literacy scores for both the English and French populations. As scores[9] on each of the components increase so do scores on the prose scale. While there is a strong association between the component scores and literacy levels in both official languages, the actual relationships differ between the two languages. This is to be expected, however, since the components reflect the particular idiosyncratic structure of each language. For this reason, in the text that follows, the relationships between the components and literacy scores are first studied separately for each language before making some comparisons between them.

9. The scores on the components are given as proportion correct, ranging from 0 to 1, in order to maintain consistency across components. The prose literacy scores have the same properties and values as in the IALSS.

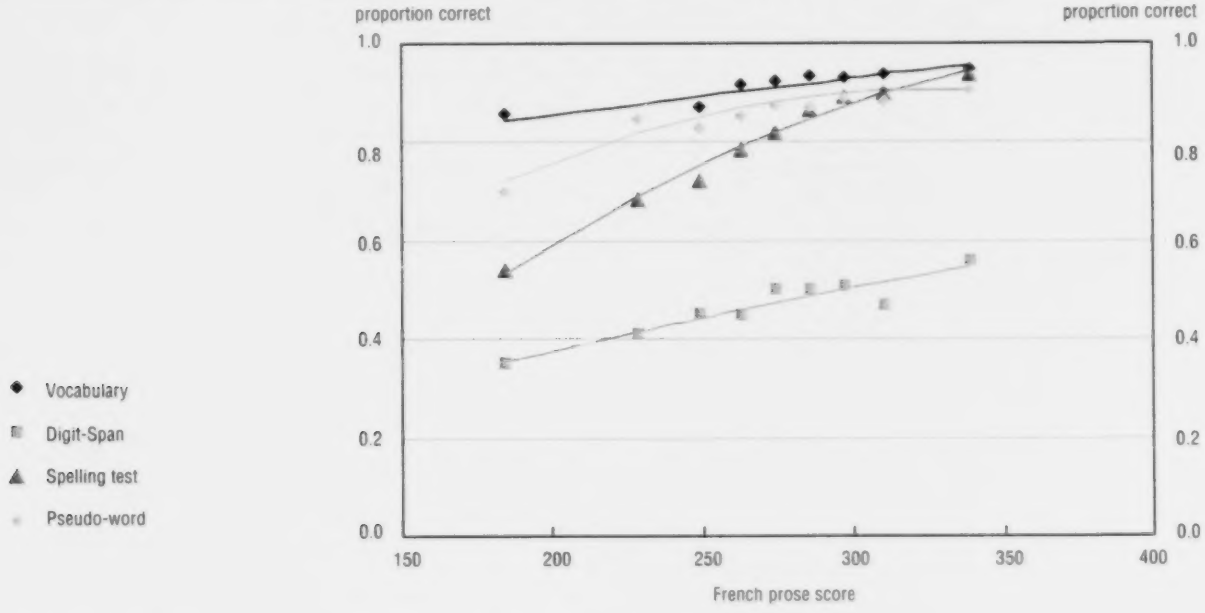
In IALSS an 80 percent criterion is used to define an individual's level on the prose and document scale.[10] In the analyses presented below the same 80 percent criterion is used to mark an individual's mastery of the reading component tasks.

It can be seen from chart 4.1 that adults vary considerably in the level at which they master different components. For those respondents tested in French the proportion correct for Pseudo-word reading reaches 0.8 at a prose score of 225 points, the transition between Levels 1 and 2. However, for Vocabulary or word knowledge the 0.8 criterion is reached at a lower prose score, before this transition to Level 2. The curves for Spelling (around 65% at prose score 225 points) and Digit-Span (at 40% at score 225 points) have not yet reached the 80 percent criterion at the threshold between Levels 1 and 2. Spelling reaches 0.8 near the transition point between Levels 2 and 3 (at a prose score of 275 points) and Digit-Span does not reach it at all.

These findings suggest that in French achieving 80 percent competence on word knowledge and word recognition is important in attaining prose literacy Level 2 and that reaching the criterion level in spelling is associated with Level 3 reading skills. Tables 4.1a-d provide further details on the relationships between prose levels and component skills. The standard errors of the estimates are given in parentheses.

Chart 4.1

Line graph showing observed scores on each component by score on the IALSS prose scale, French, Canada excluding Territories, population aged 16 to 65, 2005



Note: See Table C.3.2 in Annex C.

1. The regular word recognition task is not included in this analysis because there was little variation in scores across the prose scale.

10. The 80 percent criterion is a common standard for evaluating mastery testing of a skill or topic in master based testing (Glass, 1978).

Table 4.1a

Proportion correct on the Vocabulary test by prose level, French, Canada excluding Territories, population aged 16 to 65, 2005

	Prose literacy (French)							
	Level 1		Level 2		Level 3		Levels 4 and 5	
	percent	standard error	percent	standard error	percent	standard error	percent	standard error
Vocabulary proportion correct								
Less than 0.8	35.3	(5.9)	F	F	F	F	F	F
Greater than 0.8	64.7	(5.9)	95.2	(2.1)	98.7	(1.0)	99.5	(1.2)

F too unreliable to be published

Table 4.1b

Proportion correct on the Pseudo-word recognition test by prose level, French, Canada excluding Territories, population aged 16 to 65, 2005

	Prose literacy (French)							
	Level 1		Level 2		Level 3		Levels 4 and 5	
	percent	standard error	percent	standard error	percent	standard error	percent	standard error
Pseudo-word proportion correct								
Less than 0.6	32.8	(7.4)	7.1	(2.1)	F	F	F	F
0.6 to 0.8	36.9	(8.1)	23.1	(2.7)	17.7	(3.2)	F	F
Greater than 0.8	30.4	(8.6)	69.9	(3.3)	80.7	(3.3)	92.0	(5.8)

F too unreliable to be published

Table 4.1c

Proportion correct on the Spelling test by prose level, French, Canada excluding Territories, population aged 16 to 65, 2005

	Prose literacy (French)							
	Level 1		Level 2		Level 3		Levels 4 and 5	
	percent	standard error	percent	standard error	percent	standard error	percent	standard error
Spelling proportion correct								
Less than 0.6	61.8	(6.5)	13.1	(3.3)	F	F	F	F
0.6 to 0.8	33.7	(7.6)	35.7	(4.5)	8.2	(1.8)	F	F
Greater than 0.8	F	F	51.3	(4.8)	90.1	(1.9)	94.4	(5.3)

F too unreliable to be published

Table 4.1d

Proportion correct on the Digit-Span test by prose level, French, Canada excluding Territories, population aged 16 to 65, 2005

	Prose literacy (French)							
	Level 1		Level 2		Level 3		Levels 4 and 5	
	percent	standard error	percent	standard error	percent	standard error	percent	standard error
Digit-Span proportion correct								
Less than 0.6	94.1	(5.3)	93.5	(1.9)	86.1	(2.1)	63.5	(8.3)
0.6 and greater	F	F	6.5	(1.9)	13.9	(2.1)	36.5	(8.3)

F too unreliable to be published

In each of the Tables 4.1a-d, the proportion of respondents with scores over 0.8 (0.6 for Digit-Span) increases level by level, but the relationship between score and level differs markedly from component to component. For example, almost two-thirds of those at Level 1 in French score above 0.8 on the Vocabulary component, but just 30 percent of the population at that level score that high on the Pseudo-word recognition component and more than 95 percent fail to reach this criterion on the Spelling component.

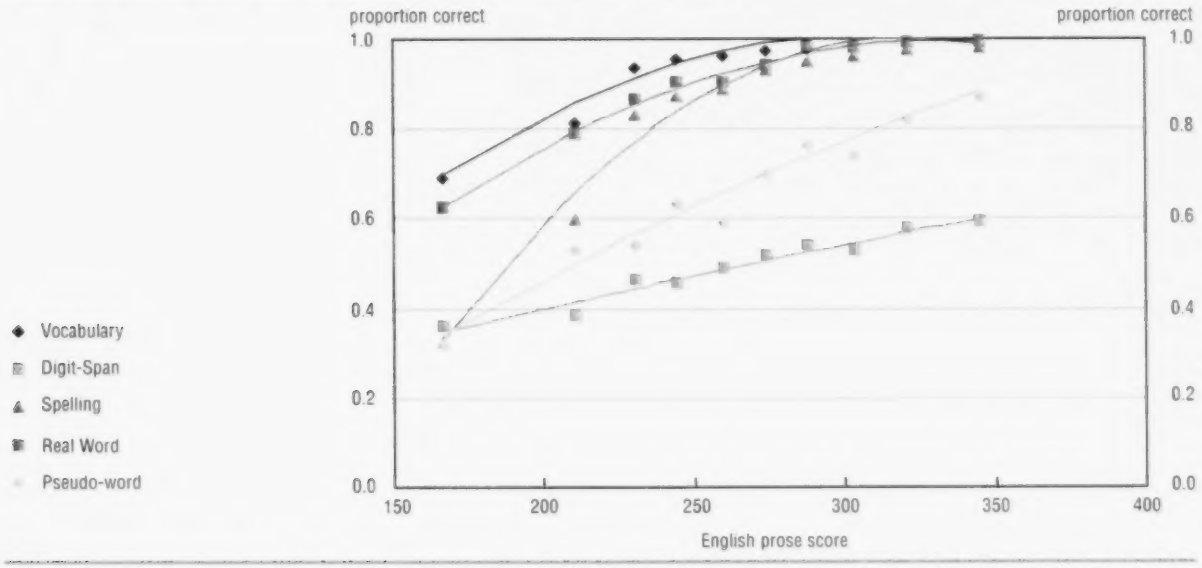
A similar pattern holds for Levels 2 and 3: a higher proportion of the population score above the criterion on Vocabulary than on Pseudo-word recognition and even fewer reach 0.8 on the Spelling component. Only at Level 4 and 5 are there only trivial differences between the components in the proportion reaching the criterion, since over 90 percent have scores above 0.8 in all three of the components.

Chart 4.2 shows that there is an equally strong relationship between component skills and prose literacy score for those who took the tests in English, though there is a different pattern for some of the reading components. As the proportion correct on each component increases so does the prose literacy level.

In English at literacy score 225 points, the proportion correct curve for vocabulary is well above 0.8 and for Real Word recognition (TOWRE-A)[11] the curve has just passed that mark. The curve for spelling in English reaches the 0.8 criterion at prose literacy scores just above the transition from Level 1 to Level 2 (225 points), instead of near the transition from Level 2 to Level 3, as is the case in French. Pseudo-word recognition (TOWRE-B) does not reach the 80% criterion until almost 325 points, the transition from Level 3 to Level 4. Tables 4.2a-e are the English equivalent to Tables 4.1a-d with Real Word recognition added for English.

Chart 4.2

Line graph showing observed scores on each component by score on the IALSS prose scale, English, Canada excluding Territories, population aged 16 to 65, 2003



Note: See Table C.3.1 in Annex C.

11. As discussed previously, the real word recognition test in French did not differentiate among respondents and is not included in this discussion. This component is included for the English test as it provided strong measurement as Chart 4.2 shows.

Table 4.2a

Proportion correct on the Vocabulary test by prose level, English, Canada excluding Territories, population aged 16 to 65, 2005

	Prose literacy (English)							
	Level 1		Level 2		Level 3		Levels 4 and 5	
	percent	standard error	percent	standard error	percent	standard error	percent	standard error
Vocabulary proportion correct								
Less than 0.8	56.4	(7.1)	14.1	(4.3)	F		F	F
0.8 and greater	43.6	(7.1)	85.9	(4.3)	98.0	(1.2)	97.9	(2.0)

F too unreliable to be published

Table 4.2b

Proportion correct on the Real Word recognition test by prose level, English, Canada excluding Territories, population aged 16 to 65, 2005

	Prose literacy (English)							
	Level 1		Level 2		Level 3		Levels 4 and 5	
	percent	standard error	percent	standard error	percent	standard error	percent	standard error
Real Word proportion correct								
Less than 0.8	61.7	(7.7)	21.3	(4.2)	7.6	(2.4)	F	F
Greater than 0.8	38.3	(7.7)	78.7	(4.2)	92.4	(2.4)	91.9	(5.1)

F too unreliable to be published

Table 4.2c

Proportion correct on the Pseudo-word recognition test by prose level, English, Canada excluding Territories, population aged 16 to 65, 2005

	Prose literacy (English)							
	Level 1		Level 2		Level 3		Levels 4 and 5	
	percent	standard error	percent	standard error	percent	standard error	percent	standard error
Pseudo-word proportion correct								
Less than 0.6	65.0	(7.1)	31.8	(4.7)	13.7	(3.5)	F	F
0.6 to 0.8	32.9	(7.2)	48.7	(5.5)	46.5	(5.1)	29.2	(7.3)
Greater than 0.8	F	F	19.5	(3.7)	39.8	(4.1)	66.2	(7.0)

F too unreliable to be published

Table 4.2d

Proportion correct on the Spelling test by prose level, English, Canada excluding Territories, population aged 16 to 65, 2005

	Prose literacy (English)							
	Level 1		Level 2		Level 3		Levels 4 and 5	
	percent	standard error	percent	standard error	percent	standard error	percent	standard error
Spelling proportion correct								
Less than 0.6	60.6	(7.4)	F	F	F	F	0.0	(0.0)
0.6 to 0.8	23.7	(5.7)	24.0	(5.1)	F	F	F	F
Greater than 0.8	F	F	70.8	(5.6)	96.5	(1.2)	98.9	(1.0)

F too unreliable to be published

Table 4.2e

Proportion correct on the Digit-Span test by prose level, English, Canada excluding Territories, population aged 16 to 65, 2005

	Prose literacy (English)							
	Level 1		Level 2		Level 3		Levels 4 and 5	
	percent	standard error	percent	standard error	percent	standard error	percent	standard error
Digit-Span proportion correct								
Less than 0.6	98.3	(1.2)	91.6	(3.2)	73.1	(4.0)	50	(7.0)
0.6 and greater	F	F	F	F	26.9	(4.0)	50	(7.0)

F too unreliable to be published

As is the case for French, there is a consistent pattern across the five components for those who took the assessment in English. As the Prose level increases so does the proportion at that level with component scores above 0.8, although the exact proportions are seldom the same in the two languages.

Fewer than half of the English Level 1 respondents are able to meet the criterion in Vocabulary, which is nonetheless the easiest of the component tests for all levels. Some Level 2 readers – about 14 percent – experience some problems with vocabulary, but at Level 3 and higher nearly all respondents scored above 0.8. Real Word recognition is a more difficult component for the lower literacy levels, as just over a third of those at Level 1 are able to score over 0.8 and 20 percent of those at Level 2 could not reach this criterion. This task was easier for those at the higher levels with more than 90 percent scoring above 0.8. The Pseudo-word recognition tasks proved much more difficult as even at Level 4 only 66 percent scored 0.8 or higher. Sixty percent of Level 3 and 80 percent of Level 2 were below this mark on this component. Almost all those at Level 1 (98%) were unable to demonstrate mastery of this component. The Spelling component provided the sharpest contrast between Levels 1 and 2. Almost 84 percent of the Level 1 respondents in English failed to reach the 0.8 mark on this component, but 70 percent of those at Level 2 did so. Level 3 and 4 respondents found the spelling tasks easy with more than 95 percent in both levels scoring above 0.8.

The results of the analysis of the relationship between IALSS prose literacy and scores on the component tests, presented in Tables 4.1a-d for French respondents and Tables 4.2a-d for English respondents, provide information relevant to the questions about the distribution of component skills that were posed in the previous chapter. The results suggest the following overall picture.

- Readers who have vocabulary knowledge that enables them to apply meaning to isolated words have access to some Level 1 tasks. There are Level 1 literacy tasks in IALSS that only require the reader to identify isolated pieces of information that are synonymous with words in the directive, so simple word knowledge of the kind required by the Vocabulary component opens some of the simpler literacy tasks just by itself. Vocabulary knowledge by itself, however, is not enough to allow a reader to successfully carry out all Level 1 tasks, and much less most Level 2 tasks, as these require more than simple word matching.

- Developing skill at recognizing words in print as measured in the Real Word and Pseudo-word tests (there are significant differences in what this means in English and French – discussed below) is associated with successful completion of Level 2 literacy tasks because nearly 80 percent of Level 2 but fewer than 40 percent of Level 1 readers do well on this component.
- Readers can also develop the skill of applying their understanding of words to a proactive task, such as Spelling, which appears to be most associated with Level 3 literacy skills, although in English a substantial number of those at Level 2 are also successful with the Spelling tasks.

Although the results suggest a common pattern of vocabulary knowledge leading to word recognition, leading in turn to control over spelling, this pattern plays out somewhat differently in English and French.

Vocabulary	More French than English readers score above mastery (80%) on the vocabulary test at each level. The differences are small at Levels 3 and 4.
Real Word recognition	French readers at all levels are able to identify regular words with such ease that scores do not differ significantly from level to level. For English readers at Levels 1 and 2, however, this task was more difficult. The 80 percent mastery level is not reached until nearly Level 2 and scores remain below 90 percent through most of Level 2. However, those scoring at Levels 3 and above are able to identify most items.
Pseudo-word recognition	For French readers, this task was below the mastery threshold at Level 1. A majority of Level 2 French readers scored above 80 percent and those at Level 3 above 90 percent. In contrast, even most Level 3 English readers do not reach the 80 percent mastery point on this test component.
Spelling	In contrast to their performance on the first three components, English readers were able to master spelling at lower prose scores than were French readers. Most of the Level 2 English readers scored above 80 percent on the spelling component, but it took Level 3 prose skill to reach that score for the French readers.
Digit-Span	This component, which is not language specific as are the other tasks, posed parallel problems in English and French. Scores crossed the 40 percent mark around the Level 1 to Level 2 boundary in both languages, reached near 50 percent between Levels 2 and 3 and did not reach 60 percent even at the Level 3 to Level 4 cut point.

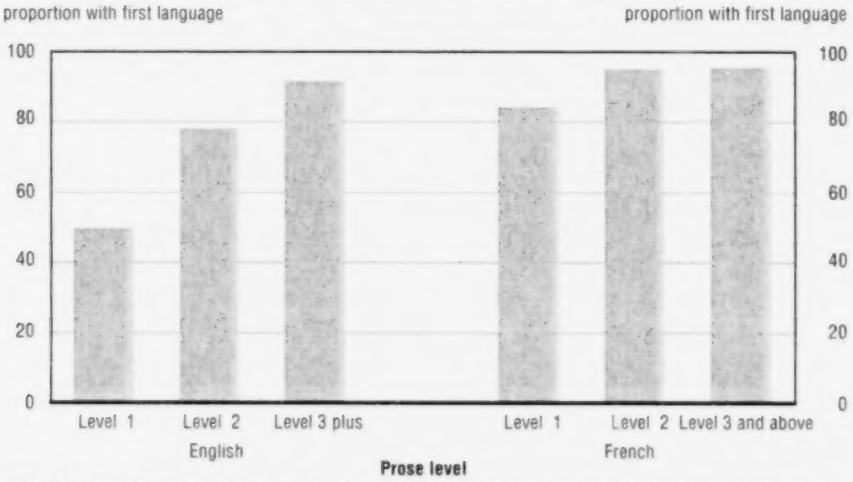
Thus each of the component skills (except regular word recognition in French) plays some role in helping to distinguish IALSS prose and document literacy levels. That they function somewhat differently in the two languages results from both linguistic and demographic differences in the sampled populations.

4.2 Component skills of Native and Non-native language speakers

Only a small minority of the respondents who were assessed in French were not native speakers (and readers) of French, but a significant proportion of those who undertook the tasks in English did not have English as their first language. Chart 4.3 shows the proportion of native speakers at each IALSS prose level in both languages. Chart 4.4 has similar information based on the language in which the respondent learned to read.

Chart 4.3

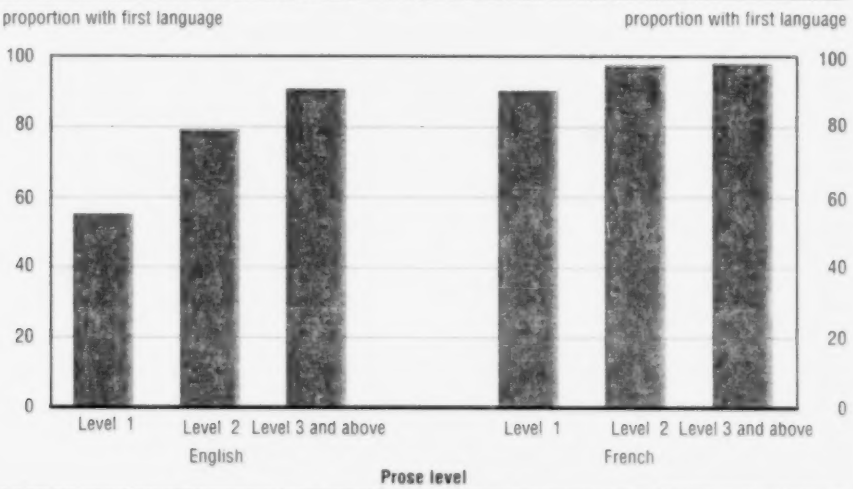
Proportion of native speakers by ISRS test language and IALSS level, Canada excluding Territories, population aged 16 to 65, 2005



Note: See Table C.4.3 in Annex C.

Chart 4.4

Proportion of native readers by ISRS test language and IALSS level, Canada excluding Territories, population aged 16 to 65, 2005



Note: See Table C.4.4 in Annex C.

The results indicate that fewer than 50 percent of those in Level 1 in English learned English as their first language and just 55 percent learned to read in English. In contrast, over 80 percent of those in Level 1 in the French IALSS assessment first learned to speak French and almost 90 percent learned to read in that language. These differences in experience with the language certainly play a role in the relationship between reading component skills and IALSS literacy levels.

Tables 4.3a-e show the distribution of scores on each of the English component tests by native language. Not surprisingly, those who did not learn English or French as their first language do consistently more poorly on the components.

Table 4.3a

Proportion of respondents by Native Language and proportion correct on the Vocabulary test, English, Canada excluding Territories, population aged 16 to 65, 2005

	Native speaker of English			
	Yes		No	
Vocabulary	percent	standard error	percent	standard error
Component proportion correct				
Less than 0.6	F	F	17.7	(2.9)
0.6 to 0.8	4.9	(1.3)	23.0	(4.0)
Greater than 0.8	94.5	(1.3)	59.4	(4.1)

F too unreliable to be published

Table 4.3b

Proportion of respondents by Native Language and proportion correct on the Pseudo-word test, English, Canada excluding Territories, population aged 16 to 65, 2005

	Native speaker of English			
	Yes		No	
Pseudo-word recognition	percent	standard error	percent	standard error
Component proportion correct				
Less than 0.3	5.92	(1.4)	15.6	(3.7)
0.3 to 0.6	12.4	(1.3)	26.1	(4.5)
0.6 to 0.8	42.9	(3.7)	36.3	(4.7)
Greater than 0.8	38.8	(2.8)	22.0	(4.9)

Table 4.3c

Proportion of respondents by Native Language and proportion correct on the Real Word test, English, Canada excluding Territories, population aged 16 to 65, 2005

	Native speaker of English			
	Yes		No	
Real Word recognition	percent	standard error	percent	standard error
Component proportion correct				
Less than 0.6	2.0	(0.5)	14.2	(4.4)
0.6 to 0.8	11.8	(1.8)	21.6	(3.4)
Greater than 0.8	86.2	(1.8)	64.2	(4.6)

Table 4.3d

Proportion of respondents by Native Language and proportion correct on the Spelling test, English, Canada excluding Territories, population aged 16 to 65, 2005

	Native speaker of English			
	Yes		No	
Spelling	percent	standard error	percent	standard error
Component proportion correct				
Less than 0.6	4.0	(1.4)	30.8	(4.2)
0.6 to 0.8	8.6	(1.5)	19.6	(3.2)
Greater than 0.8	87.4	(2.0)	49.7	(4.4)

Table 4.3e

Proportion of respondents by Native Language and proportion correct on the Digit-Span test, English, Canada excluding Territories, population aged 16 to 65, 2005

	Native speaker of English			
	Yes		No	
Digit-Span	percent	standard error	percent	standard error
Component proportion correct				
Less than 0.6	73.4	(2.5)	86.8	(3.5)
Greater than 0.6	26.6	(2.5)	13.2	(3.5)

While native speakers always did better on the component tests, just how much better they did varied from component to component. The biggest differences between native and non-native speaker are on the most language specific components – Vocabulary and Spelling. These require the greatest familiarity with actual words in the language. The smallest difference is on the component with the least language demand – Digit-Span. In fact, all one needs to know to perform well on this task are the first 10 digits. In the middle are the components that are typically taught in English as a Second Language (ESL) programs – the pronunciation patterns of words - and which can be learned without knowing much more about the language.

Similar patterns are found in the French language components, but because of the much smaller numbers of non-native speakers the results need to be interpreted with caution. Tables 4.4a-d show the results by native language for the French language components. The differences between first language groups in French are similar to what was found for English, except that the relative performance on Word recognition and Vocabulary are about the same in French, while Spelling is especially hard for non-native speakers.

Table 4.4a

Proportion of respondents by Native Language and proportion correct on the Vocabulary test, French, Canada excluding Territories, population aged 16 to 65, 2005

	Native speaker of French			
	Yes		No	
Vocabulary	percent	standard error	percent	standard error
Component proportion correct				
Less than 0.8	4.6	(0.9)	32.0	(8.0)
Greater than 0.8	95.4	(0.9)	68.0	(8.0)

Table 4.4b

Proportion of respondents by Native Language and proportion correct on the Pseudo-word test, French, Canada excluding Territories, population aged 16 to 65, 2005

	Native speaker of French			
	Yes		No	
Pseudo-word recognition	percent	standard error	percent	standard error
Component proportion correct				
Less than 0.6	5.7	(0.9)	20.5	(8.2)
0.6 to 0.8	19.6	(1.7)	35.1	(10.0)
Greater than 0.8	74.8	(2.1)	44.4	(6.4)

Table 4.4c

Proportion of respondents by Native Language and proportion correct on the Spelling test, French, Canada excluding Territories, population aged 16 to 65, 2005

	Native speaker of French			
	Yes		No	
Spelling	percent	standard error	percent	standard error
Component proportion correct				
Less than 0.6	10.0	(1.6)	40.0	(9.8)
0.6 to 0.8	18.5	(1.8)	27.2	(7.3)
Greater than 0.8	71.6	(2.6)	32.8	(8.0)

Table 4.4d

Proportion of respondents by Native Language and proportion correct on the Digit-Span test, French, Canada excluding Territories, population aged 16 to 65, 2005

	Native speaker of French			
	Yes		No	
Digit-Span	percent	standard error	percent	standard error
Component proportion correct				
Less than 0.3	2.9	(0.8)	F	F
0.3 to 0.6	83.2	(1.7)	86.9	(5.2)
Greater than 0.6	14.0	(1.6)	F	F

F too unreliable to be published

At the same time, there is evidence from studies of children learning to read that the French orthography is more transparent and more consistent than that of English.[12] If this were the case then one could postulate that the connection between component skills and prose literacy proficiency might not be as strong in French as in English. The correlations between the reading component scores and the prose literacy scores are indeed lower in French than in English, albeit only slightly so, as Table 4.5 shows.

Table 4.5

Correlation between reading component scores and prose literacy scores by language of assessment, Canada excluding Territories, population aged 16 to 65, 2005

	Prose literacy score (English test)	Prose literacy score (French test)
	coefficient of correlation	
Vocabulary	0.599	0.542
Real word reading	0.559	...
Pseudo-word reading	0.558	0.412
Spelling	0.830	0.737
Digit-Span	0.694	0.612

... not applicable

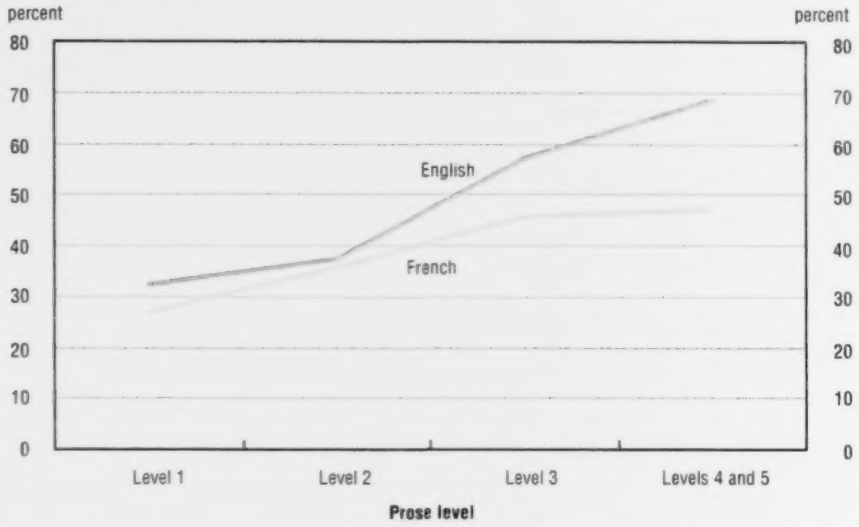
4.3 Influence of reading experience and education

The high correlation between spelling and prose literacy scores deserves some comment. The original design of the ISRS assumed a causal relationship between the reading components and literacy proficiency with the goal of identifying elements that could be addressed in adult literacy programs. Although spelling was included as a component, it is more likely that the relationship between spelling and literacy is recursive. That is, it is likely that the increased literacy skill measured by the prose score and the increased exposure to text that accompanies higher skill provides broader and deeper experience with text. The IALSS and the studies that preceded it showed that higher literacy scores were also related to higher uses of reading at work and at home. Chart 4.5 shows the proportion of respondents who say they read books at least once a week by prose level for each language.

12. Specifically, Seymour, Aro and Erskine (2003) show that Grade 1 French children outperform Grade 2 English children of the same age on real word and pseudo-word tasks similar to those in the two TOWRE tests used in ISRS. They attribute the difference to greater complexity in English orthography.

Chart 4.5

Proportion of ISRS respondents who report reading a book at least once a week, by language, Canada excluding Territories, population aged 16 to 65, 2005



Tables 4.6a-b show that frequency of reading is related to success on the spelling component. In both English and French, the proportion of respondents reporting reading books weekly who score above the 0.8 criterion is larger than for those who report less frequent reading.

Table 4.6a

Proportion correct on the spelling component by book reading frequency, English, Canada excluding Territories, population aged 16 to 65, 2005

	Book reading frequency							
	Never		Rarely		Less than once a week		At least once a week	
Spelling	percent	standard error	percent	standard error	percent	standard error	percent	standard error
Component proportion correct								
Less than 0.6	21.9	(6.5)	10.5	(3.8)	F	F	5.5	(2.4)
0.6 to 0.8	25.0	(5.3)	16.1	(4.8)	6.8	(1.7)	5.4	(1.2)
Greater than 0.8	53.1	(6.3)	73.4	(6.5)	89.9	(2.1)	89.1	(2.0)

F too unreliable to be published

Table 4.6b

Proportion correct on the spelling component by book reading frequency, French, Canada excluding Territories, population aged 16 to 65, 2005

	Book reading frequency							
	Never		Rarely		Less than once a week		At least once a week	
Spelling	percent	standard error	percent	standard error	percent	standard error	percent	standard error
Component proportion correct								
Less than 0.6	23.0	(3.9)	12.8	(4.3)	10.7	(3.4)	6.5	(1.7)
0.6 to 0.8	28.1	(4.5)	25.0	(4.8)	18.2	(4.8)	11.3	(2.2)
Greater than 0.8	48.8	(6.2)	62.2	(6.1)	71.1	(4.6)	82.2	(2.9)

F too unreliable to be published

The same pattern holds for the other reading components. While it is likely that increases in component skill enable a reader to employ reading strategies more effectively and improve comprehension (which is what prose and document literacy scores measure), it is also likely that greater amount of reading that seems to accompany improved comprehension also enables a reader to further develop vocabulary and word recognition.

While IALSS and previous adult literacy surveys demonstrate that literacy is not simply the same as education, levels of education obviously play a major part in determining literacy skill. The relationships between educational attainment and literacy proficiency with the reading components is displayed in Tables 4.7a-d.

Table 4.7a

Proportion of respondents who took the tests in English by highest level of education and proportion correct on the vocabulary component, Canada excluding Territories, population aged 16 to 65, 2005

	Highest education level							
	Primary or less		Less than high school		High school		Post-secondary	
Vocabulary (English)	percent	standard error	percent	standard error	percent	standard error	percent	standard error
Component proportion correct								
Less than 0.8	84.5	(10.0)	21.9	(6.3)	12.1	(2.2)	6.9	(1.2)
Greater than 0.8	F	F	78.1	(6.3)	87.9	(2.2)	93.1	(1.2)

F too unreliable to be published

Table 4.7b

Proportion of respondents who took the tests in French by highest level of education and proportion correct on the vocabulary component, Canada excluding Territories, population aged 16 to 65, 2005

	Highest education level							
	Primary or less		Less than high school		High school		Post-secondary	
Vocabulary (French)	percent	standard error	percent	standard error	percent	standard error	percent	standard error
Component proportion correct								
Less than 0.8	62.8	(12.0)	10.6	(2.8)	F	F	2.6	(0.9)
Greater than 0.8	37.2	(12.0)	89.4	(2.8)	96.0	(2.5)	97.4	(0.9)

F too unreliable to be published

Table 4.7c

Proportion of respondents who took the tests in English by highest level of education and proportion correct on the Pseudo-Word component, Canada excluding Territories, population aged 16 to 65, 2005

	Highest education level					
	Less than high school		High school		Post-secondary	
Pseudo-word recognition (English)	percent	standard error	percent	standard error	percent	standard error
Component proportion correct						
Less than 0.3	20.6	(6.1)	11.7	(3.4)	2.2	(0.8)
0.3 to 0.6	16.5	(4.5)	15.0	(3.1)	14.1	(1.8)
0.6 to 0.8	50.4	(8.8)	42.9	(5.3)	38.8	(3.4)
Greater than 0.8	F	F	30.3	(3.7)	45.0	(3.6)

F too unreliable to be published

Table 4.7d

Proportion of respondents who took the tests in French by highest level of education and proportion correct on the Pseudo-Word component, Canada excluding Territories, population aged 16 to 65, 2005

	Highest education level					
	Less than high school		High school		Post-secondary	
Pseudo-word recognition (French)	percent	standard error	Percent	standard error	percent	standard error
Component proportion correct						
Less than 0.6	17.3	(2.6)	F	F	F	F
0.6 to 0.8	28.4	(3.0)	24.2	(4.2)	15.5	(2.7)
Greater than 0.8	54.3	(3.9)	69.0	(4.6)	82.4	(2.7)

F too unreliable to be published

While it is apparent that education level plays a role in success on these components, three aspects deserve further discussion.

1. The relationship between education and component score is stronger for those who answered the tests in French. For example, the correlation between education and vocabulary is 0.490 in English, but 0.742 in French. The relationship is weaker in English largely due to the greater proportion of non-native speakers in the English sample. For this group, familiarity with the language probably overrides the beneficial effect of education.[13]

2. The relationship between education and component score is stronger for vocabulary than for pseudo-word recognition. Table 4.8 presents the relevant correlations. One of the effects of further education is to increase the exposure to broader vocabulary, but, in general, word recognition skills should be acquired relatively early in the education process and the added benefit of further education should progressively decline. Thus, one would expect the pattern found in Table 4.8. Adults continue to add vocabulary through their life as they are exposed to new information through reading.

13. Unfortunately, the sample sizes of the ISRS are too small to permit a statistical test of this hypothesis.

3. It is likely that longer exposure to spoken language by itself does not greatly enhance vocabulary. Longer education also means longer exposure to written text and exposure to more complex texts and vocabulary.

Table 4.8

Coefficients of correlation between level of education and two component scores by language of test, Canada excluding Territories, population aged 16 to 65, 2005

	Correlation between education level and	
Language of test	Vocabulary	Pseudo-word recognition
	coefficient of correlation	
English	0.490	0.287
French	0.742	0.420

Several key messages emerge from these results.

1. The literacy learning needs of non-native speakers are different from those of native speakers. The patterns of relationship between components and literacy proficiency are not the same for the two groups. It seems unlikely that programs designed for one group will serve the other group as well.
2. A key component, vocabulary, is closely related to educational achievement and thus should be amenable to focused instruction.
3. There do seem to be real differences between English and French in the ease with which novel words are recognizable. Native speakers of English and French perform comparably on the vocabulary tests (compare Tables 4.3a and 4.4a). But on the test of word recognition, the French native speakers out-perform their English counterparts (compare Tables 4.3b and 4.4b). This is consistent with findings from studies of children learning French and English.

4.4 Interrelationships among components

The results discussed above demonstrate that the components are each individually related to success on the IALSS literacy tasks. Those results do not show how the components fit together to form the whole that an individual uses to solve literacy tasks. In general, the components are not highly correlated with each other, as indicated in Tables 4.9a and 4.9b. In particular, the correlations between vocabulary and the other components except spelling are low. This suggests that individuals might have success on one component without success on another. It might be expected, then, to find different patterns of relationships among components and that these patterns might relate quite differently to prose literacy.

Table 4.9a

Coefficients of correlation among the components for respondents who took the tests in English, Canada excluding Territories, population aged 16 to 65, 2005

	Vocabulary	Real word reading	Pseudo-word reading	Spelling	Digit-Span
	coefficient of correlation				
Vocabulary	1.00	...	...	...	...
Real word reading	0.39	1.00	...	...	...
Pseudo-word reading	0.36	0.54	1.00	...	...
Spelling	0.63	0.61	0.59	1.00	...
Digit-Span	0.30	0.44	0.48	0.58	1.00

... not applicable

Table 4.9b

Coefficients of correlation among the components for respondents who took the tests in French, Canada excluding Territories, population aged 16 to 65, 2005

	Vocabulary	Pseudo-word reading	Spelling	Digit-Span
	coefficient of correlation			
Vocabulary	1.00	...	...	...
Pseudo-word reading	0.31	1.00	...	...
Spelling	0.49	0.58	1.00	...
Digit-Span	0.27	0.39	0.48	1.00

... not applicable

In fact, when a standard clustering procedure[14] is applied to the component scores from the ISRS, four distinct groups, or latent "classes", of respondents can be identified, each with a unique pattern of component scores. Table 4.10 lists each of these classes along with the average percent correct on each of the components. The same data for the components is displayed graphically in chart 4.6. The clustering procedure is independent of language and gives the same latent class results for both English and French. Unless a specific distinction between the languages is identified, the results reported below apply to both languages.

Box 4.1

How does latent class analysis work?

Individuals are organized into groups or classes based on their patterns of performance on the five component skills. More specifically, the scores of the five components skill test are analyzed using Latent Class Analysis (LCA) methods (Lazarsfeld and Henry, 1968; Patterson, Dayton and Graubard, 2002). LCA is a statistical tool for clustering subjects based on categorical variables. This analysis yields a probabilistic classification for each survey participant, where the classes are represented by different tendencies to perform in a certain way (more formally, each class is characterized by its conditional response probabilities) in each of the five components. Latent class analysis identifies relatively homogeneous groups of learners that share common sets of learning needs. Latent classes can then be situated on the overall prose literacy scale and profiled demographically.

14. The procedure used in ISRS is latent class analysis. For details see Annex B.

In order to obtain more stable parameters and to maintain LCA inferential structures with the US Level 1 study, the LCA parameters were estimated using a combined dataset including Canadian English and French and the US Level 1 data. The distributions of classes for each of three datasets were estimated separately using the same conditional response probabilities. See Annex C for more details.

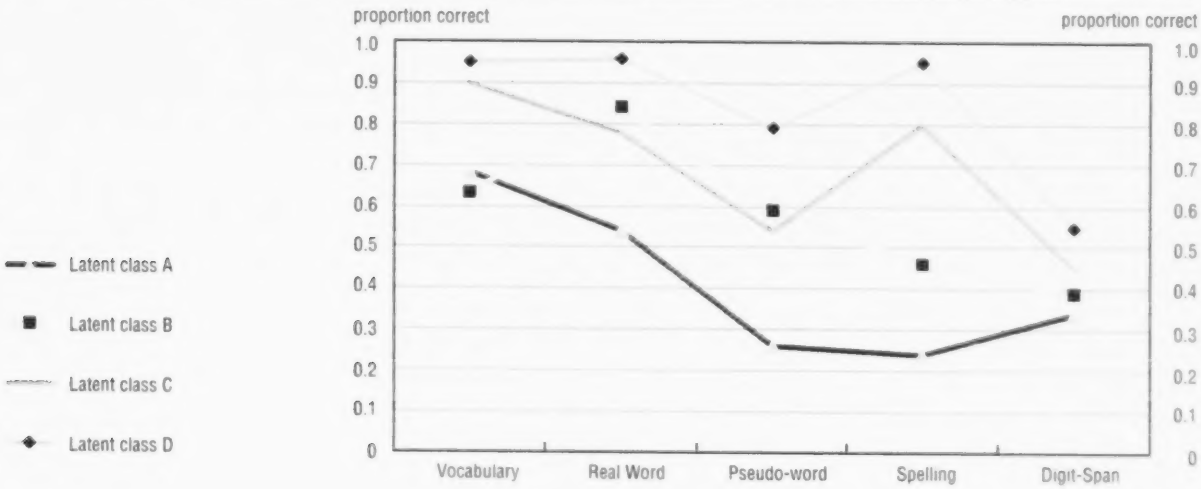
Table 4.10

Average proportion correct on each component test for each latent class, Canada excluding Territories, population aged 16 to 65, 2005

	Latent class A		Latent class B		Latent class C		Latent class D	
	average proportion correct	standard error	average proportion correct	standard error	average proportion correct	standard error	average proportion correct	standard error
Component								
Vocabulary	0.68	(0.04)	0.63	(0.02)	0.90	(0.01)	0.95	(0.00)
Real Word Recognition	0.54	(0.03)	0.84	(0.03)	0.78	(0.02)	0.96	(0.00)
Pseudo-word Recognition	0.26	(0.03)	0.59	(0.03)	0.54	(0.02)	0.79	(0.01)
Spelling	0.24	(0.03)	0.45	(0.03)	0.76	(0.02)	0.93	(0.00)
Digit-Span	0.34	(0.02)	0.39	(0.02)	0.45	(0.01)	0.55	(0.01)

Chart 4.6

Average proportion correct scores on each component displayed separately for each latent class, Canada excluding Territories, population aged 16 to 65, 2005



Note: See Table C.4.6 in Annex C.

4.5 Characterization of components by latent classes

Using the results displayed in chart 4.6, the latent classes can be described as follows:

Latent class A	This class has moderate scores on the vocabulary test with the average near 70 percent. Scores on the word recognition tests (54% and 26%) are well below the 80 percent criterion and are the lowest of the four classes. The average for spelling at just 25 percent is also the lowest. These class characteristics suggest that a key characteristic is difficulty in using vocabulary knowledge in reading. This class includes those with **moderate vocabulary but poor decoding skills.**
Latent class B	This class has a low average vocabulary score (just over 60%), much like Latent Class A. Unlike Class A, however, the average scores for the word recognition tests are much higher; on real word recognition the average is 84 percent, higher than the 80 percent criterion score, while for pseudo-word recognition it is 59 percent. In both cases this average is slightly higher than Latent Class C. Those in this class also do poorly on the spelling test. This suggests that the key characteristics of this class are some control of decoding, but a lack of language knowledge to allow those skills to be used effectively. This class includes those with **moderate vocabulary and moderate decoding skills.**
Latent class C	The vocabulary score for Class C is high, at 90 percent well over the 80 percent criterion score and the average for spelling (76%) is near the criterion. However, the decoding scores are more modest, 78 percent for real word recognition and just 54 percent for pseudo-word recognition. This is lower than the decoding scores for class B. This class can be characterized by very high language knowledge, but weaker decoding skills that may limit the ability to use all the language knowledge in effective reading. This class includes those with **high vocabulary knowledge and moderate decoding skills.**
Latent class D	The average scores for every component are highest for this class, over 80 percent on every component except pseudo-word recognition, which at 79 percent is very close to criterion. This is the class that has the decoding skills to make use of strong language knowledge its members possess. It includes those with **high vocabulary and high decoding skill.**

These class characteristics are summarized in Table 4.11.

Table 4.11

Defining characteristics of each latent class, Canada excluding Territories, population aged 16 to 65, 2005

Latent class	Decoding	Vocabulary
Class A	Poor	Moderate
Class B	Moderate	Moderate
Class C	Moderate	High
Class D	High	High

Table 4.12 suggests that the two latent classes with the lowest overall combination of component scores, classes A and B, represent just a small proportion of the Canadian population. Fewer than four percent in each language group are in each of them. More are in latent class C, with 13.1 percent of the French test population and 16.5 percent of the English population. The great majority of Canadians, more than three quarters, are in class D.

Table 4.12

Estimated proportions of the population in each latent class, Canada excluding Territories, population aged 16 to 65, 2005

	Latent class A		Latent class B		Latent class C		Latent class D	
	percent	standard error	percent	standard error	percent	standard error	percent	standard error
	Proportion in latent class							
Language of tests								
French	2.2	(0.6)	2.9	(0.7)	13.1	(1.5)	81.8	(1.8)
English	3.8	(0.8)	3.0	(0.7)	16.5	(1.8)	76.7	(1.9)

Although the latent classes are determined by performance on the component tests, one would expect them to represent different levels of performance in prose literacy. The results indicate a clear difference from class to class, as shown in Table 4.13.

These averages correspond readily to the prose literacy levels measured in IALSS:

Table 4.13

Average prose literacy scores for each latent class by language of test, Canada excluding Territories, population aged 16 to 65, 2005

	Prose literacy score			
	French		English	
Latent class	mean score	standard error	mean score	standard error
Class A	178	(14.6)	178	(9.7)
Class B	200	(6.4)	207	(7.7)
Class C	244	(4.0)	256	(5.8)
Class D	293	(2.0)	302	(2.3)

Latent class A	Average scores among this class are the lowest and fall into the lower part of the range of scores in Level 1. This suggests that the typical reader in this class will have difficulty completing tasks at Prose Level 1.
Latent class B	The prose scores for this group are the next lowest and fall near the upper end of the Level 1 range. This means that a typical reader from this class will be successful with most Level 1 tasks.
Latent class C	With average scores near 250, this class represents the middle of the Level 2 range. Hence the typical Class C reader will be successful on the average Level 2 task.
Latent class D	The high average score for this class falls in the middle of the Level 3 range. A reader typical of this class will be able to complete the average Level 3 task.

Further, the latent classes are strongly related to the IALSS prose levels, as Tables 4.14a-b indicate.

Table 4.14a

Proportion of respondents in each latent class by IALSS prose level, English, Canada excluding Territories, population aged 16 to 65, 2005

	Prose level (English)						
	Level 1		Level 2		Level 3 and above		Total
Latent class	percent	standard error	percent	standard error	percent	standard error	percent
Latent class							
Class A	87	(7.6)	F	F	F	F	100
Class B	77	(9.0)	F	F	F	F	100
Class C	28	(5.7)	40	(5.7)	32	(4.9)	100
Class D	F	F	24	(3.0)	75	(2.8)	100

Table 4.14b

Proportion of respondents in each latent class by IALSS prose level, French, Canada excluding Territories, population aged 16 to 65, 2005

	Prose level (French)						
	Level 1		Level 2		Level 3 and above		Total
Latent class	percent	standard error	percent	standard error	percent	standard error	percent
Class A	92	(7.5)	F	F	F	F	100
Class B	86	(11.9)	F	F	F	F	100
Class C	34	(6.2)	50	(5.2)	16	(4.3)	100
Class D	F	F	28	(3.1)	69	(3.1)	100

F too unreliable to be published

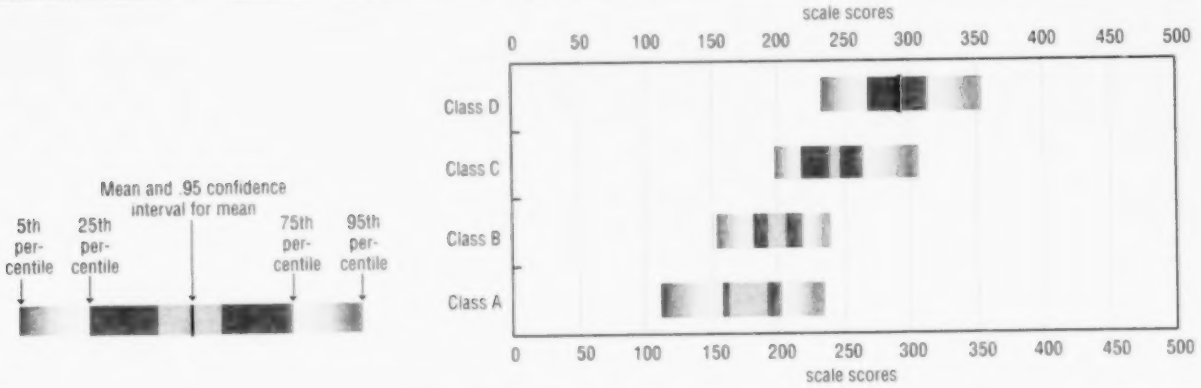
Classes A and B have primarily Level 1 respondents, Class C has mostly Level 2 respondents, and Class D is typically Level 3 and above. The observations lead to the following conclusions. First, in order to reach Level 2 in normal circumstances, a reader needs strong vocabulary knowledge and at least moderate decoding skills (Class C). Second, to reach Level 3 in normal circumstances a reader needs both strong vocabulary knowledge and decoding skills (Class D). Third, without at least adequate vocabulary knowledge and decoding skills a reader will have difficulty even with Level 1 tasks (Class A).

While this describes the *typical* member of each class, it must be recognized that some members of a class are able to complete some tasks from a higher level and some find tasks from even a lower level difficult, as the plots in chart 4.7a-b demonstrate. Nonetheless while some members of Classes A and B are able to complete less difficult Level 2 tasks, none are successful with Level 3 tasks. And although there are readers in Class C who can respond successfully to the easier Level 3 tasks, few have prose scores that indicate they would be successful with the more difficult Level 3 tasks and none would be able to complete average Level 4 tasks.

That there are readers from Class D whose prose scores are in the Level 2 range indicates that while skill on the components may be a necessary condition to reach higher levels of literacy it is not sufficient. Other skills, most likely reading strategies not covered in the components study, also must play a role. At the same time, it needs to be noted that Level 1 tasks present no problems for readers in Class D. Hence the components play an *enabling* role. Without command of them, it is almost impossible to achieve high levels of literacy. But someone who does have control over the components may not perform the literacy tasks as well as they could due to other reading limitations.

Chart 4.7a

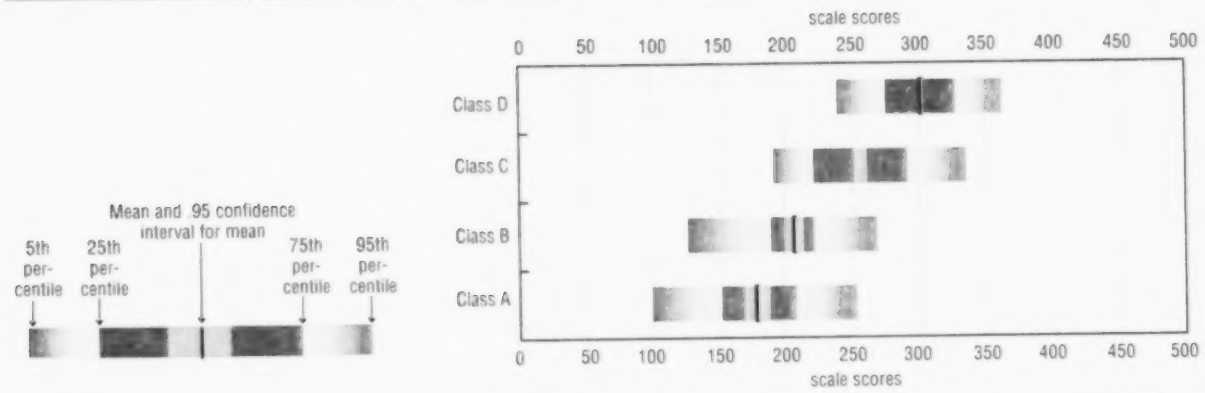
Mean scores with .95 confidence intervals and scores at the 5th, 25th, 75th and 95th percentiles on the prose literacy scale for each latent class, French, Canada excluding Territories, population aged 16 to 65, 2005



Note: See Table C.4.7a in Annex C.

Chart 4.7b

Mean scores with .95 confidence intervals and scores at the 5th, 25th, 75th and 95th percentiles on the prose literacy scale for each latent class, English, Canada excluding Territories, population aged 16 to 65, 2005



Note: See Table C.4.7b in Annex C.

Latent classes may also provide a tool for distinguishing two kinds of Level 1 skill. Most IALSS levels identify people who are successful with literacy tasks at that level, but are not successful with tasks at the highest level. Thus, someone in Level 3 has a high probability of being able to complete tasks that are typical of that level, but not those typical of Level 4. Level 1, however, also includes individuals who have a low probability of success on even Level 1 tasks. Given the pattern of component scores and the lower prose scores for Class A compared to Class B, it seems reasonable to propose that those individuals who find difficulty with Level 1 tasks are more likely to be in Latent class A, while those in Latent class B are those who are successful with tasks at Level 1.

4.6 Demographic characteristics of latent classes

The results discussed in the preceding section make clear the contribution of the component skills, as a set, to understanding reading and literacy skills, but they do not identify who is in which class and why. This following section looks at some demographic characteristics of the classes.

Educational attainment

While education is not synonymous with literacy, all previous literacy surveys conducted in Canada have demonstrated the strong connection between the two. Table 4.15 shows the educational make up of each of the latent classes by language.[15]

Table 4.15

Proportion of each latent class who have attained different levels of education, by language of test, Canada excluding Territories, population aged 16 to 65, 2005

	English test			
	Less than secondary graduation		Secondary graduation and higher	
Latent class	percent	standard error	percent	standard error
Class A	42	(10.6)	58	(10.6)
Class B	F	F	69	(14.2)
Class C	27	(5.6)	73	(5.6)
Class D	12	(2.3)	88	(2.3)
All classes	16	(2.1)	84	(2.1)

	French test			
	Less than secondary graduation		Secondary graduation and higher	
Latent class	percent	standard error	percent	standard error
Class A	74	(13.7)	F	F
Class B	81	(8.5)	F	F
Class C	60	(5.6)	40	(5.6)
Class D	14	(1.9)	87	(1.9)
All classes	22	(2.5)	77	(2.5)

F too unreliable to be published

15. Sample sizes do not allow for a more detailed breakdown of educational attainment.

In English the proportion of those with secondary graduation or higher in Classes A, B, and C is smaller than for the population as a whole. This is particularly so for latent Class A, the class with the lowest prose score and component profile. It should be noted that this class is especially low on the components most likely affected by education – decoding and spelling. In French the same classes (A, B, and C) have a larger proportion without a secondary diploma than is the case for the whole population, though the difference between Class A and B is reversed with Class B having the larger proportion without a diploma. The differences between French and English proportions represent the different relationship between the component scores and literacy proficiency discussed in Chapter 3, as well the different patterns of levels of education in the two groups.

Native language

The results discussed previously in this chapter also showed a relationship between native language and component scores. Table 4.16 has that data for the latent classes.

Table 4.16

Proportions of native and non-native speakers in each latent class by language, Canada excluding Territories, population aged 16 to 65, 2003

	English test			
	English		Other	
Latent class	percent	standard error	percent	standard error
Class A	41	(11.6)	59	(11.6)
Class B	F	F	90	(5.0)
Class C	80	(4.0)	20	(4.0)
Class D	92	(1.1)	8	(1.1)
All classes	82	(1.4)	17	(1.4)

	French test			
	French		Other	
Latent class	percent	standard error	percent	standard error
Class A	77	(15.1)	F	F
Class B	75	(14.0)	F	F
Class C	84	(4.9)	16.1	(4.9)
Class D	98	(0.8)	F	F
All classes	94	(1.3)	6	(1.3)

F too unreliable to be published

Note: Native speakers of French who took the components test in English are included in the English speaking category as their performance was not significantly different; for the same reason, native speakers of English who responded in French are grouped with French native speakers.

The two test language groups have significantly different proportions of non-native speakers and, as a result, the pattern is different. In English, there are large proportions of non-native speakers in Classes A and B, and especially Class B. It is to be expected that those for whom English is not their native language will have more difficulty with literacy tasks. What is most interesting, however, is that Class B, the class with adequate decoding skills but lower vocabulary knowledge, would be the class with the largest proportion of such speakers. If these individuals were able

to read in their own first language, they could use some of that skill in the English decoding tasks, but not in the vocabulary knowledge tasks. The language knowledge barrier seems also to reduce the proportion of non-native speakers in Class D in both languages.

For reasons that are not apparent from the data, the pattern is different in French. Both Classes A and B have the same proportion of native speakers, but this proportion is smaller than in the population as a whole and in Classes C and D; in this the French results parallel those in English.

The majority of non-native speakers are also immigrants, but many immigrants come to Canada speaking English or French. For example, 39 percent of the immigrants in the English group spoke English as their first language and 42 percent of the French group spoke French. The focus in the reading components study is with native language because it is experience with the language that affects scores on the component tests, not immigrant status as such.

Age

Building on previous literacy reports, Chapter 2 has shown that older Canadians tend to have lower literacy scores. The estimates given in Table 4.17 indicate that there are typically fewer young adults in Classes A and B than would be expected from the population distribution, especially in Class B in English. This may be because of the large number of non-native speakers in Class B, many of whom are immigrants who tend to come to Canada at an older age. The age distribution in Classes C and D in English and Class D in French closely match the population figures.

Table 4.17

Proportions of individuals of different ages in each latent class by test language, Canada excluding Territories, population aged 16 to 65, 2007

	English test					
	16 to 35		36 to 50		51 and over	
Latent class	percent	standard error	percent	standard error	percent	standard error
Class A	34	(11.0)	38	(9.7)	28	(8.7)
Class B	27	(7.7)	F	F	45	(12.6)
Class C	43	(6.8)	35	(5.5)	22	(5.3)
Class D	42	(1.5)	37	(1.5)	21	(1.1)
All classes	41	(0.9)	37	(1.1)	22	(1.1)
	French test					
	16 to 35		36 to 50		51 and over	
Latent class	percent	standard error	percent	standard error	percent	standard error
Class A	F	F	65	(15.9)	F	F
Class B	F	F	55	(10.5)	F	F
Class C	29	(5.7)	40	(6.3)	31	(5.4)
Class D	37	(3.3)	33	(3.4)	30	(2.4)
All classes	35	(3.1)	36	(3.3)	29	(2.3)

F too unreliable to be published

Reading for pleasure

About 52 percent of those in the English test group and 41 percent in the French group report that they read books at least once a week. As might be expected, that distribution varies from latent class to latent class. The estimates are given in Table 4.18.

Table 4.18

Proportions of individuals who read books frequently in each latent class by test language, Canada excluding Territories, population aged 16 to 65, 2005

	English test			
	Read books once a week or more often		Don't read books at least once a week	
Latent class	percent	standard error	percent	standard error
Class A	F	F	65	(12.4)
Class B	F	F	84	(8.2)
Class C	39	(6.4)	61	(6.4)
Class D	57	(3.1)	43	(3.1)
All classes	52	(2.6)	48	(2.6)

	French test			
	Read books once a week or more often		Don't read books at least once a week	
Latent class	percent	standard error	percent	standard error
Class A	F	F	96	(2.6)
Class B	F	F	76	(9.7)
Class C	29	(6.1)	71	(6.1)
Class D	44	(2.8)	56	(2.8)
All classes	41	(2.5)	59	(2.5)

F too unreliable to be published

Individuals in Class D are considerably more likely to read books at least once a week and those in Class A and B are the least likely to do so. Reading may be both an outcome of the skills profile of those in Class D, but it also undoubtedly contributes to that profile. In reading a reader will confront new vocabulary and find opportunities for decoding novel words, and so develop both skills.

Because Class B in English has such a large proportion of non-native speakers, the low level of reading found there is likely both a product of the level of skill and the availability of reading materials. As first language is not the fundamental distinction between Classes A and B in French, the pattern there shows more clearly a level of literacy effect, with the class lowest in literacy proficiency, Class A, reporting the least reading. The reading frequency characteristic of a class grows as the average component and literacy skill of the class increases.

Social and economic outcomes

As the latent classes are closely related to literacy proficiency and that proficiency is in turn related to labour market outcomes, it is to be expected that there are social and economic effects associated with the classes. Table 4.19 presents estimates of the relationship between the latent classes and income. The sample size is too small to support an analysis of this relationship by gender.

Table 4.19

Proportions of individuals at different income levels in each latent class by test language, Canada excluding Territories, population aged 16 to 65, 2005

	English test			
	Income $25,000 and below		Income above $25,000	
Latent class	percent	standard error	percent	standard error
Class A	59	(12.4)	41	(12.4)
Class B	74	(13.3)	F	F
Class C	56	(6.0)	44	(6.0)
Class D	44	(3.6)	56	(3.6)
All classes	47	(2.9)	53	(2.9)

	French test			
	Income $25,000 and below		Income above $25,000	
Latent class	percent	standard error	percent	standard error
Class A	75	(12.6)	F	F
Class B	79	(10.8)	F	F
Class C	62	(5.7)	38	(5.7)
Class D	47	(3.8)	53	(3.8)
All classes	50	(3.2)	50	(3.2)

F too unreliable to be published

The patterns for Classes C and D are similar in English and French with more Class D individuals earning more than $25,000 annually.[16] But as results included in several previous tables have shown, the two other classes differ between the two languages. In French Classes A and B have about the same income profiles,[17] whereas in English a considerably larger portion of Class B than of Class A is in the lower income bracket. This likely has to do with the larger non-native speaker population in English who are in Class B.

16. As the total for Table 4.19 shows, $25,000 approximately divides the population into half. As income data was collected at $5000 increments, data was not available to make a more precise division into halves.
17. Some subtle differences may have been lost as a consequence of the need to consolidate categories to obtain reliable statistics.

4.7 Conclusion

In summary the latent classes represent quite distinct sets of literacy skills.

Latent class A	This class has the lowest prose literacy scores, at the lower end of IALSS Level 1. This is related to the low scores on the components, which, in turn, seem to follow primarily from low levels of education in both English and French. In particular, those in this latent class have not acquired the decoding ability necessary for developing literacy. It represents 3.8 percent of the English population and 2.2 percent of the French population.
Latent class B	The literacy skills of the adults in this class are limited primarily by lack of vocabulary. Their performance on decoding tasks is as good as that typical of Latent class C and enables them to succeed at most Level 1 tasks, but the tasks at Level 2 appear to require a level of vocabulary not available to readers in this class. Their vocabulary limitations seem primarily from lack of familiarity with the language of the test (most often the case for those taking the test in English) or from low levels of education (most often the case for those taking the test in French). It represents 3.0 percent of the English population and 2.9 percent of the French population.
Latent class C	The pattern of component skills for this class is similar to that for the fourth class, Latent class D, but overall at a lower level in each component. Level 2 tasks are easily within the reach of Latent class C and some able to accomplish simpler Level 3 tasks. The levels of education for this class are somewhat lower than that for Class D, but the most telling difference is in the use of literacy. Readers in this class are much less likely to engage in regular reading; this lack of experience provides fewer opportunities to develop vocabulary and enhance decoding skills. It represents 16.5 percent of the English population and 13.1 percent of the French population.
Latent class D	As noted above, the pattern of skill for Classes C and D is similar, though those in Class D score higher across all the components. This is the most skilled class, has the highest levels of education and the greatest engagement with literacy. Level 3 tasks are easy for most members of this class and some, of course, are able to do tasks at Levels 4 and 5. It represents 76.7 percent of the English population and 81.8 percent of the French population.

It is important to point out that in terms of the components, Latent class C is more like Latent class D, than like either Classes A or B. Since Class C is the typical Level 2 class while Classes A and B represent Level 1 and Class D Level 3 and above, it follows that the skills that underlie Level 2 are more like those for Level 3 than for Level 1. If both Level 1 and Level 2 are considered to lie below the desired skill threshold, then it must also be recognized that much differing approaches to program intervention are required for the two levels.

The profiles of component skill established through the latent classes have importance to both policy and practice. In policy, the latent classes add considerable insight into the nature of the skills that make up the IALSS literacy levels, and are especially useful in understanding what sorts of reading difficulties characterize performance in Levels 1 and 2. The latent class data also suggest that Level 2 adults differ from those in Level 1, not just by the amount of literacy, but also by the configuration of component skills. Those in Level 2 have considerably more language knowledge than their Level 1 counterparts, whether the latter are in Class A or B, as evidenced by their higher vocabulary knowledge and spelling scores. But even with vocabulary knowledge near the same level as readers who are more likely to be in Level 3, the low decoding skills make Level 3 tasks too difficult for them.

This suggests, for example, that expectations that use of clear language approaches which focus primarily on vocabulary and sentence structure, may have little benefit for those in Level 2 (particularly those in Level 2 who are also in Latent class C) as the typical reading difficulty for these readers is not vocabulary. Further, the components and latent class groupings provide additional insight into Level 1 by distinguishing those Level 1 adults who are likely to find even the easiest tasks difficult from those who can manage the largely vocabulary based Level 1 tasks, but not the more complex Level 2 tasks.

Latent classes may also provide a tool for distinguishing two kinds of Level 1 skill. Most IALSS levels identify people who are successful with literacy tasks at that level, but are not successful with tasks at the highest level. Thus, someone in Level 3 has a high probability of being able to complete tasks that are typical of that level, but not those typical of Level 4. Level 1, however, also includes individuals who have a low probability of success on even Level 1 tasks. Given the pattern of component scores and the lower prose scores for Class A compared to Class B, it seems reasonable to suggest that those individuals who find difficulty with Level 1 tasks are more likely to be in Latent class A, while those in Latent class B are those who are successful with tasks at Level 1.

In conclusion it may be asked, what do the latent classes and the components explain about literacy? Clearly they do not explain everything. Individuals reading at Level 3 do not differ in any significant way in their component scores from those at Levels 4 and 5, and even those at Level 2 are often indistinguishable from Level 3 readers. Nor do the latent classes help explain the differences between the higher literacy levels, as Table 4.20 demonstrates.

Table 4.20

Proportions of individuals by prose level and latent class for each test language, Canada excluding Territories, population aged 16 to 65, 2005

	French test			
	Latent class A, B and C		Latent class D	
Prose literacy level	percent	standard error	percent	standard error
Level 1	79.1	(7.1)	21.1	(7.1)
Level 2	23.9	(3.6)	76.1	(3.6)
Level 3 and above	3.6	(0.9)	96.4	(0.9)
	English test			
	Latent class A, B and C		Latent class D	
Prose literacy level	percent	standard error	percent	standard error
Level 1	89.6	(4.3)	F	F
Level 2	29.9	(5.1)	70.1	(5.1)
Level 3 and above	9.2	(1.7)	91.5	(1.7)

F too unreliable to be published

Almost all those at Level 3 and above are in latent class D and the great majority of those at Level 2 are also in D, so that the latent classes do not distinguish these higher levels. But this finding is expected. Analyses of the IALSS levels have shown that three properties of the items, namely semantic complexity, structural complexity, and the amount of information, are sufficient to explain much of the differences between the levels. Adults are at Level 2 not because they lack component skills, but because they lack the reading strategies necessary to process Level 3 tasks. In contrast, however, most individuals who are at Level 1 are there in large part because they *do* lack some or all component skills. The evidence from the ISRS suggests that until they acquire the component skills, it will be difficult for them to acquire the reading strategy skills that provide access to Level 2 and more difficult tasks. Furthermore, the components, especially as they define latent classes A, B and C, provide an insight into Level 1 and help delineate the characteristics of individuals who are at the lowest level of adult literacy.

Author

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Chapter 5

Conclusions and implications for public policy and instruction

Based on the evidence collected in previous literacy surveys, it is widely accepted that literacy proficiency influences the employability, earnings, health, social engagement and access to future learning of individuals. The absence of notable change in literacy performance in Canada between 1994 (IALS) and 2003 (IALSS), and the observed variations in results between the provinces, have created an interest in how the literacy skills of adults might be improved. Differences in literacy performance between individuals, and regional economies, matter to Canada because they constrain our ability to compete with countries where the level of literacy skill is rising rapidly. Thus, literacy levels might influence future economic growth rates and, hence, living standards for Canadians.

Nearly 57 percent of all Canadians aged 16 to 65 years with proficiency at Level 1 on the IALSS prose scale, and 70 percent of those with literacy proficiency at Level 2, were employed at the time the data were collected. Their labour market prospects, and the life chances of the people with low literacy who are not in the labour force, can be greatly enhanced if literacy levels could be improved. Canada as a whole would greatly benefit as well. The findings presented in this report add considerably to our understanding of the nature of the adult literacy challenges and the appropriate ways in which these could be addressed.

- As predicted by theory and evidence, performance on the reading components was closely related to the emergence of fluid and automatic reading required for Level 3 and above prose literacy proficiency in English and in French. There was a direct relationship between the performance in the components tested in the ISRS and the scores achieved on the prose literacy assessment.

- The performance of those who took the reading component tests in French differed from those who took them in English, which reflected the linguistic and orthographic differences between the two languages. The differences were further affected by the fact that there were more non-native speakers taking the test in English than in French.
- In order to identify relatively homogeneous groups of learners that share common sets of literacy learning needs, the latent class analyses yielded four distinct groups, as shown in Table 4.10.
- The latent class analysis was based on testing the component competencies related to vocabulary, decoding and working memories which are essential for fluid reading and comprehension.

Latent class A had the lowest prose literacy scores at the lower end of Level 1. This is related to the respondents' low scores on the components, especially because they had not acquired the decoding ability necessary to be competent readers. In general, their literacy skills are so limited that it is very difficult for them to reliably gain new information from print.

Those in Latent class B are limited primarily by their lack of vocabulary. Their decoding abilities enable them to succeed at most Level 1 tasks but the tasks at Level 2 appear to require a higher level of vocabulary than they currently hold. The English Latent class B group is primary composed of non native speakers.

Respondents in Latent class C are more similar to people in class D than to individuals in class A and B. However adults in class C had lower scores on each component than those in class D. They are capable of coping with most Level 2 tasks and some of the easier Level 3 ones. The striking difference between class C and D is their use of literacy. People in class C are less likely to engage in regular reading thus they have less opportunity to improve vocabulary and decoding skill.

Adults in Latent class D have higher scores in all components, although their pattern of reading performance is similar to that of people described by Latent class C. Level 3 tasks are easily performed and even some tasks at Levels 4 and 5 are correctly executed. However a good proportion of people in that class are still classified at Level 2 (28%).

As mentioned in Chapter 4 the component skill analysis seem to demonstrate that people at level 1 and people at level 2 differ not only in their literacy ability but also in the configuration of their component skills. People at level 2 have more similar patterns of skill to the level 3 people then the people at level 1.

It is also important to point out that a large proportion of level 2 adults, (70% of those who took the test in English and 76% of those who did the test in French) are in class D. This finding implies that Class D adults have mastered the component skills but appear not to have acquired the reading strategies that would allow them to cope reliably with Level 3 tasks.

If the objective were to raise competencies for people that are at level 1 and 2 the component analysis suggest that the remedial approaches for each group should be adapted to their needs. The types of program interventions designed to support each of these classes have to be targeted to match the particular literacy learning needs of the different groups. Therefore, it would be helpful to know the distribution of learners across the classes. Table 4.12 presents this information separately for the French and English speaking population.

The two latent classes with the lowest component scores, classes A and B, represent a very small proportion (fewer than 4% in each class) of the Canadian population. There is a slightly higher percentage of the English population in Class C (16.5%) compared to the French population (13.1%).

Key implications for public policy and instruction

- Canada has very few people who could be termed "illiterate" who are non-readers, even when non native speakers in English and French are included. About 16% percent of adults with Levels 1 and 2 proficiency in French and in English have limited reading ability. Most of them possess some of the required component skills, albeit at a level below that required for Level 3 proficiency. Though interventions have to be intense and perhaps longer term, the total investment costs needed for raising the overall literacy level of the Canadian adult population might be significantly lower than first estimated because this group is small.
- Plain language initiatives[18], while necessary and desirable, are unlikely to afford access to print information for three of the four classes. Proficiency in both decoding and vocabulary is required for even comprehension of simple text.
- The latent classes suggest that Level 2 adults differ from those at level 1, not just in their level of proficiency but also in the configuration of their component skills. Those at Level 2 have higher vocabulary and spelling scores. Despite their adequate vocabulary, their low decoding skills make Level 3 tasks too difficult. Therefore the interventions for those at Level 1 will have to be substantially different from those used for people at Level 2 proficiency. Those at Level 2 need to focus more on their decoding skills while maintaining their vocabulary.
- A large proportion of those in latent class A have low levels of education. There are, however, also many adults who have managed to complete their secondary schooling despite their reading difficulties. This will likely affect their future learning paths as well as their daily functioning in society. Ideally, standards at graduation from secondary school should ensure that Level 3 literacy proficiency is attained by all as a basis for functioning well in the global knowledge economy. This is because decoding skills in particular are gained during secondary education while vocabulary may continue to be gained through work, reading and future training to augment the basic level attained during such education.
- A significant proportion of adults in the three lowest latent classes are immigrants, particularly those whose first language is neither English nor French. For many, their current literacy proficiency is inadequate given the high levels demanded in the Canadian economy and society. The program interventions on offer in Canada today are often ill suited to empower them to increase their performance and to enable them to work and earn at their potential, given their levels of education.

18. Plain language is a process. It starts with understanding the readers needs and skills and the purpose of your document. Plain language initiatives draw on the same research that supported the IALSS and ISRS assessments by making clear what features of text help people read, understand, and use written information. Plain language is clear, concise, and well-organized. Source: NWT Literacy Council.

- It is important, therefore, that those at the lower latent classes are given opportunities to participate in appropriate literacy training programs in order to benefit from future adult education and training.

Literacy is a key competence in a world where information, whether print or digital, is ubiquitous. The International Study of Reading Skills has provided valuable information about the patterns of reading abilities of the least-skilled adult readers in society. This information can now be put to good use in making decisions about how to plan and deliver appropriate and efficient reading instruction for different groups of adult learners. The new dataset should inform the development of better diagnostic systems for adults with low levels of literacy, tailoring the contents and modalities of literacy program interventions and instruction to their needs, and creating improved strategies to encourage active participation by adult learners.

Authors

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Annex A

Assessment design and survey methodology

The International Survey of Reading Skills (ISRS) is a follow-up survey of the International Adult Literacy and Skills Survey (IALSS). The survey was designed to provide measures of proficiency in several literacy and life-skill domains for adult populations, in particular skills thought to be important economically and socially. The Canadian component also profiled skill sets for targeted subpopulations such as youth, urban aboriginals, immigrants, and linguistic minorities in certain sub-national regions. As for ISRS, it mainly focuses on adults with low literacy proficiency. These adults are of great interest to policy makers and information collected up to now has not provided sufficient data to support the design of efficient and effective remedial programs.

The objectives of the ISRS are, first, to provide national population estimates of specific reading skills among adults with low literacy level and to compare them with adults with greater literacy level; second, to identify the relationship between reading skills and both literacy skills and other characteristics of adults; and third, to identify sub-groups based on patterns of performance on reading activities.

Assessment design

The ISRS measured two aspects of adult literacy: prose literacy and document literacy. The survey also measured five reading-related skills: word recognition, vocabulary, listening comprehension, general reading processing skills and spelling.

Prose literacy skills and document literacy skills were assessed with a set of tasks designed to simulate day-to-day reading and writing activities, such as signing a library card, reading an advertisement, and following a recipe. The tasks were arranged in two booklets: a Core Task Booklet containing nine simple tasks, and a

Main Task Booklet containing 31 tasks divided into two blocks. Respondents were asked to complete the Core Task Booklet first, and if they had at least three correct answers, they were asked to complete the Main Task Booklet.

Word recognition was assessed with the Test of Word Recognition Efficiency (TOWRE) – real words (TOWRE-A) and pseudo-words (TOWRE-B). Vocabulary was assessed with the abridged Peabody Picture Vocabulary Test (PPVT-m), and general processing skills were assessed with the Rapid Automatized Naming (RAN) test and the Digit-Span test and spelling with an abridged version of a test developed by Moats.[19]

Target population

The ISRS targets the population of 16 years of age or older residing in the 10 Canadian provinces at the time of the IALSS data collection (June 2003), excluding institutional residents, members of the armed forces, and individuals living on Indian Reserves or remote regions. Also, the ISRS target population excludes individuals over 65 years of age for the Anglophone population. Individuals over 65 years of age were retained in the French population to increase the sample size and were used to derive the prose and literacy scale scores. However, they were excluded from the data analyses performed for this report.

Residents of sparsely populated regions were also excluded from the survey population for operational reasons. Even when combined with the first exclusions listed above, this represented no more than two percent of the total population in the 10 provinces (including those over 65 years of age).

Sample frame

The most recent Census of Population and Housing at the time of IALSS planning, with a reference date of May 15th 2001, was chosen as the frame for IALSS. More specifically, the survey frame consisted of households enumerated by the Census long-form sample (which contains 20% of the Canadian population). As the ISRS is a follow-up of IALSS, the sample frame is identical.[20]

Sample design

A stratified, multi-phase and multi-stage sample design was used to select the ISRS sample. As ISRS is a follow-up of IALSS, its first-phase sample design is the same as that used for IALSS.

The IALSS sample was selected from the Census Frame using a stratified, multi-stage probability sample design. This survey was designed to yield separate samples for the two official languages, English and French. In addition, the sample size was increased to produce estimates for a number of population subgroups. Provincial ministries and other organizations sponsored supplementary samples to increase the base or to target specific subpopulations such as youth (ages 16 to 24 in Québec and 16 to 29 in British Columbia), adults aged 25 to 64 in Québec, linguistic minorities (English in Québec and French elsewhere), recent and established immigrants, urban aboriginal peoples, and residents of the northern territories.

19. For a complete description of these components, see Chapter 3.

20. For more detailed information on the IALSS sample design the reader is referred to the report, *Building on our Competencies: Canadian Results of the International Adult Literacy and Skills Survey* (Statistics Canada, 2003).

The Census Frame was further stratified, within each province, into an urban stratum and a rural stratum. The urban stratum was restricted to urban centres of a particular size, as determined from the previous census. The remainder of the survey frame was delineated into primary sampling units (PSUs) that contained sufficient population in terms of the number of dwellings within a limited area of reasonable compactness. In addition, a general indication of the education level of the population from the 1996 Census was incorporated to create PSUs that reflected the educational distribution of their province.

Within the urban stratum, two stages of sampling were used. In the first stage, households were selected systematically with probability proportional to size. The size measure was constructed in terms of the number of adults in a household. For the second stage, individuals were randomly selected at collection from the list of eligible household adults.

Three stages were used to select the sample in the rural stratum. In the first stage, PSUs were selected with probability proportional to population size as measured by the total number of adults for each sample's survey population in the 2001 Census. The second and third stages for the rural stratum repeated the same methodology employed in the two-stage selection for the urban stratum.

The ISRS was designed to produce Canada-level estimates for the two official languages, English and French. The sample was drawn from IALSS respondents that accepted, during its collection, to participate in a follow-up survey. Since the focus of the study is the adult population with low literacy level, the ISRS sample targets mostly individuals who are at IALSS prose literacy Level 1. Units were then selected randomly within strata defined by the cross-classifications of language (English, French), provinces, subpopulations, literacy levels estimated from IALSS, and age groups. This was done to respect IALSS design as much as possible. Afterwards, the sample was reduced by 15 percent to cut field expenses. Two rounds of cuts were undertaken: eliminate a number of remote and expensive interviewer assignments (which represent half of the 15% cuts) and drop Anglophones over 65 years old (which had the impact of reducing the target population). It would have been best if they were accomplished with the drawing of the sample, but this was not possible due to time and operational constraints.

Since a significant percentage of respondents refused to take part in a follow-up survey, a non-response analysis was performed to ensure that there was no substantial difference between the individuals who agreed to participate in a follow-up survey and those who refused. As can be seen from tables A.1 and A.2, a larger percentage of Level 1 individuals than of Level 2+ individuals refused to take the follow-up survey. However, since the aim was not to estimate literacy levels in the population but the relationship between the literacy scale and component performance, this had no impact. The key point was to ensure that the individuals within each literacy level who agreed to participate in the follow-up survey were not different from those who refused. A comparison of the two groups was performed using a number of demographic variables. That analysis showed that individuals' characteristics were similar within each literacy level. There appeared to be no substantial difference between the individuals within each literacy level who agreed to participate in the follow-up survey and those who refused.

Table A.1

Percentage distribution of English respondents by contact status, population aged 16 to 65, Canada excluding Territories, 2003

	Accepted to be re-contacted		Refused to be re-contacted	
	percent	standard error	percent	standard error
Level 1				
Prose	31.7	1.8	68.3	1.8
Document	33.0	1.8	67.0	1.8
Level 2				
Prose	53.1	1.5	46.9	1.5
Document	55.0	1.4	45.0	1.4
Level 3				
Prose	67.8	1.4	32.2	1.4
Document	66.8	1.2	33.0	1.2
Level 4				
Prose	76.3	1.9	23.7	1.9
Document	75.2	2.1	24.9	2.1
Level 5				
Prose	81.6	6.5	F	6.5
Document	83.8	7.0	F	7.0

F too unreliable to be published

Table A.2

Percentage distribution of French respondents by contact status, population aged 16 to 65, Canada excluding Territories, 2003

	Accepted to be re-contacted		Refused to be re-contacted	
	percent	standard error	percent	standard error
Level 1				
Prose	27.0	2.5	73.0	2.5
Document	27.6	2.7	72.4	2.7
Level 2				
Prose	44.9	2.3	55.1	2.3
Document	48.5	2.3	51.5	2.3
Level 3				
Prose	61.4	2.1	38.6	2.1
Document	60.3	1.8	39.7	1.8
Level 4				
Prose	65.3	3.4	34.7	3.4
Document	64.7	3.9	35.3	3.9
Level 5				
Prose	70.1	10.2	F	10.2
Document	69.1	12.5	F	12.5

F too unreliable to be published

Sample size

The IALSS sample assigned to each province had a base sample covering their general population. Additionally, supplementary samples were added to increase the base or to target specific subpopulations. These samples were selected sequentially, one after another, starting with the base sample. After the selection of each sample, chosen households were removed from the frame before the next selections, thereby making the samples dependent.

The ISRS sample was determined by examining distributions of IALSS literacy levels and age groups by language, regardless of supplementary samples, and considering non-response and cost constraints. The ISRS overall sample size is 2,967, of which 1,585 for English and 1,382 for French.

Data collection

The ISRS survey design combined educational testing techniques with household survey techniques to measure literacy and reading skills and provide the information necessary to make the measures meaningful. The tests (Main Task Booklets and tests of reading-related skills) were the last of a series of collection instruments to be applied. First, respondents were asked to complete a background questionnaire, which consisted of several information modules required to relate the tested skills to the respondents' economic and social situations. Specifically, interviewers asked respondents a series of oral questions about their education, the language they use in various situations, their labour force status and another set of questions about health and disabilities. The mean time required to administer the background questionnaire was about 30 minutes.

Once the background questionnaire had been completed, respondents were given a short booklet of nine relatively simple reading tasks (Core Task Booklet). Respondents who answered at least three of the nine core tasks correctly were given the much larger, more difficult Main Task Booklet containing 31 tasks. The booklet tests were not timed, and respondents were encouraged to attempt every item. Respondents were given every opportunity to demonstrate their skills, even if they were minimal.

Next, all respondents, regardless of their score on the Core Tasks, were asked to complete a series of additional exercises. Designed to measure reading-related skills, the tests were administered as follows. The first exercise was the abridged Peabody Picture Vocabulary Test (PPVT-m), which required respondents to identify which of four different images corresponded to a word spoken by the interviewer. Next came the RAN test, in which respondents were asked to read a series of random letters as quickly as possible. The third exercise involved reading a list of real words (TOWRE-A), followed by a list of pseudo-words (TOWRE-B), as quickly as possible. The time limit for each word list was 60 seconds. The fourth exercise was PhonePass, which contained three different tasks: repetition of simple sentences, a set of short-answer questions, and reading of simple sentences. The fifth test involved repeating a series of digits in order and another series of digits in the opposite sequence to how they were read. The final exercise was a spelling test.

The ISRS was a paper and pencil survey, but the RAN, TOWRE, PhonePass and Digit-Span tests were recorded over the telephone. Ordinate Corp. developed the telephone recording system. The tests were administered in such a way that the interviewer, using a special phone, called the recording system and the respondent completed the test on the telephone while the interview listened.

Data collection began in October 2004, and the final interviews were conducted in February 2005. All survey documents were returned to Head Office in March 2005.

To ensure high data quality, both the Survey Administration Guidelines and Statistics Canada's own internal policies and procedures were followed. The interviews were conducted in the respondent's home in a neutral manner. Interviewer training and supervision were provided, with particular emphasis on the importance of precautions against non-response bias. Interviewers were specifically instructed to return several times to non-respondent households in order to obtain as many responses as possible. Since the ISRS was a follow-up to the IALSS, specific respondents had to be contacted and special procedures were implemented to ensure that ISRS respondents were in fact the same individuals who took part in the IALSS the year before. Particular attention was paid to respondents for whom contact information was no longer available or whose address and telephone number had changed since the IALSS interview in 2003. Supervision of the interviewers' work included frequent quality checks at the beginning of data collection, with fewer quality checks as collection progressed; assistance was also made available to interviewers during the data collection period.

Test scoring accuracy was essential to ensure high data quality. To achieve accuracy, every record was entered twice (100% keystroke verification).

Test scoring

The task booklets were scored differently from the tests of reading-related skills. Some of the tests of reading-related skills (PhonePass, TOWRE and RAN) were scored from audio files, while others (PPVT, Digit-Span and Spelling) were scored from the answer sheets completed by the interviewer. Scorers received intensive training in scoring the responses to the task booklets and the tests of reading-related skills. Detailed instructions were provided in a scoring manual.

First, different scorers scored at least 30 percent of the task booklets twice. International standards require a 95 percent match between scorers for each booklet item. Specific procedures were implemented to determine which booklets would be rescored. Rescoring was carried out in three phases. In the initial phase, the first 100 booklets were all scored twice so that scoring problems could be identified right away, additional information could be provided to scorers, and changes could be made in the scoring manual if necessary. In the second phase, 80 of the next 250 booklets were rescored, and in the third phase, 40 of each subsequent set of 250 booklets were rescored. This less intensive rescoring was essential to maintain high quality in scoring throughout the process. The 95 percent match between the scoring and rescoring was checked in each phase. Throughout the scoring period, all items for which the match was less than 95 percent were examined closely so that errors could be identified and required changes could be made in the scoring manual and scorer training. In addition, a 97 percent match was required for the entire set of items. The rescoring process is intended primarily to monitor inter-scorer reliability and correct scoring procedures if necessary. Only the initial scoring is changed, if necessary, and corrections can be made only where there are systematic errors in an item. Because of the careful verification throughout the scoring process, scores rarely had to be altered. In the ISRS, no scores were changed at this stage.

Second, to ensure scoring consistency between the English and French booklets, 20 percent of the French booklets were rescored by the English scoring team, and 20 percent of the English booklets were rescored by the French scoring team. The required match rate was 95 percent. Each item for which the match rate was

less than 95 percent was examined more closely to identify systematic errors (always the same type of scoring error for a typical response). Systematic errors affect data quality. When a systematic error was detected, all booklets in which the item was scored wrong were reviewed, and if the same systematic error was found, they were corrected. Overall, very few items had a match rate of less than 95 percent.

TOWRE-A (Real Words). Scoring was done using audio files. Strict instructions were given on the pronunciations that were acceptable. To insure quality, 40 percent of theses tests were rescored by a second scorer. The first 200 cases were rescored to detect inconsistency in the scoring early in the process. Each item that had more than five percent discrepancy was looked at closely with the scorer to insure consistency and quality. Rescoring occurred during the entire scoring period to ensure quality throughout the process. The TOWRE-A scoring went fine. There was no inter-language rescoring for the TOWRE-A test since the test was not the same.

TOWRE-B (Pseudo-words). Scoring was done using audio files. Strict instructions were given on the pronunciations that were acceptable. To insure quality, 100 percent of the tests were rescored by a second scorer. The first 200 cases were looked at really closely to detect inconsistencies and refine scoring. The TOWRE-B task was not easy to score. Items with more then five percent inconsistency were examined closely. All the disagreements between scorers for all the items that had more than five percent discrepancy were sent for arbitration. The arbitrated score was the final score kept on the file. There was no inter-language rescoring for the TOWRE-B test since the test was not the same.

RAN. Scoring was done using audio files. Strict instructions were given on the pronunciations that were acceptable. To ensure quality, 20 percent of the tests were rescored by a second scorer. The first 100 cases were rescored to detect inconsistency in the scoring early in the process. No problems were found. This test was easy to score.

Spelling. Each scorer had a response sheet with the exact spelling of the words. This task was easy to score and no rescoring was required.

PPVT-m. Four different pictures were presented to the respondent on each page of the shortened PPVT notebook. As interviewers showed one page, they read a word that describes one of the pictures. The respondent had to indicate which picture matched the word. The interviewer recorded the respondent's responses on the PPVT – Interviewer's Recoding Sheet. These recording sheets were imaged and captured at Statistics Canada after collection. They were 100 percent verified. An automated program was run to score each question and to attribute a score to each question.

Digit-Span – Forward & Backward. Sets of numbers were read to the respondent and the respondent was asked to repeat the numbers, either in the same order or in reversed order. The interviewer had to record the respondent's answers on the Digit-Span Forward and Backward – Interviewer's Recording Sheet. These recording sheets were imaged and captured at Statistics Canada after collection. They were 100 percent verified. A program was run to score each question and to attribute a final score to each respondent.

Table A.3

Score reliability in percent by reading component, population aged 16 to 65, Canada excluding Territories, 2005

Test	English	French
	percent	
TOWRE-A	99	99
TOWRE-B	93	95
RAN-1	99	99
RAN-2	99	99
Main booklets	98	97

Survey response and weighting

The ISRS respondent's data is considered complete for the purposes of the scaling of psychometric assessment data provided that one of the reading exercises has been completed or the Core Booklet and at least one of the reading exercises has been completed. The ISRS has a total of 1,885 respondents out of 2,967, which gives a response rate of 64 percent.

The ISRS sample has a very complex design, involving stratification, multiple phases, multiple stages, systematic sampling, probability proportional to size sampling, overlapping samples and reduction after sample selection. Furthermore, there is a need to compensate for the non-response that occurred at varying levels. Therefore, the estimation of population parameters and the associated standard errors is dependent on the survey weights. Two types of weights were calculated: survey weights that are required for the production of population estimates, and jackknife replicate weights that are used to derive the corresponding standard errors.

Survey weights

ISRS population weights were derived in three steps: calculation of the design weights; weighting adjustments for non-response; and calibration. The design weights were defined as the inverse of the probabilities of selection. As the ISRS sample was selected from IALSS respondents, the IALSS weights before calibration were taken as the initial ISRS weights. These weights have been adjusted for IALSS sample selection, IALSS non-response and for the overlapping of the samples. Also, as the ISRS sample was more specifically selected from IALSS respondents that accepted to participate in a follow-up survey, the initial ISRS weights needed to be adjusted to compensate for refusal and no answer to the follow-up question. After, they were inflated to take the ISRS sample selection into account by a factor equal to the inverse of the probabilities of selection. Furthermore, they needed to be adjusted for sample cuts that were made after ISRS sample selection. The cuts that were adjusted for do not include the removal of the Anglophones over 65 years old since they were suppressed from the target population for ISRS. The adjusted weights are the design weights.

The weighting adjustments for non-response were calculated by first categorizing the sample units as either respondents or non-respondent individuals. A logistic regression was used subsequently to determine variables that have an influence on response, obtain predicted probabilities of responding and form weighting classes as homogeneous as possible by grouping similar estimated response probabilities together. Finally, the design weight of each respondent was adjusted by the inverse of the weighted response rate of the weighting class in which the respondent belongs in order to represent all individuals.

Finally, the weights were calibrated using the age and sex group population totals, where the age group was defined as 16 to 25, 26 to 35, 36 to 45, 46 to 55, and 56 to 65 years. These were obtained using the 2001 Census of Population and Housing inflated according to the growth measured between provincial age and gender totals from the Census and the corresponding official demographic counts as of June 21, 2003 (midpoint of the IALSS collection). The benchmarks used for ISRS include only the 10 provinces, and exclude the 66and over age group because the population counts for the Francophone population were not easily available (the Anglophone population for this age group was removed from ISRS targeted population). It was not possible for ISRS to include more benchmarks since the sample size was too small.

Jackknife weights

To simplify variance estimation, it was assumed that the various samples (base sample and supplementary samples) were selected independently. It is believed that this assumption causes a slight overestimation of the variance. This assumption allowed the use of jackknife variance estimation by treating the samples from different frames as samples from different strata, and applying the jackknife as for stratified sampling. To meet international standards, thirty jackknife replicate weights were developed for the IALSS survey for use in determining the standard errors of the survey estimates. The 30 replicates cut across strata – for each of the different samples (base sample and supplementary samples), 30 replicates were created within each stratum.

In the urban strata, households were selected systematically in the first stage of sample selection. The replicates were formed by sorting the households in the order that was used for the systematic sample selection, and by assigning replicate numbers sequentially from 1 to 30 to the households, restarting back to 1 after reaching 30.

In the rural strata, PSUs were selected in the first stage of selection. Since fewer than 30 PSUs were selected in all strata, the PSUs were split to form the replicates. As much as possible, the PSUs were split into an equal number of replicates. If this was not possible, the PSUs with a larger number of respondents were split into more replicates. For example, if 11 PSUs were selected for a particular province and sample, then the eight PSUs with the greatest number of respondents would each be split into three replicates, and the remaining three PSUs would each be split into two replicates, in order to obtain a total of 30 replicates.

The replicates were formed using the initial IALSS sample of over 40,000 units. Each jackknife weight was created by removing one replicate from each stratum for each of the samples. ISRS initial jackknife weights are the ISRS weights before calibration (i.e. the non-response adjusted weights). For each of the 30 jackknife replicate weights, the weights were changed to 0 for the removed replicate; and the weights of the other replicates were adjusted within each stratum and sample type (base sample and supplementary samples) to compensate for this. Then, the calibration step was repeated to ensure that the sum of weights in the age/sex groups matched the population totals. It was not deemed worthwhile to redo the non-response adjustments as the IALSS had done because the adjustment had almost no impact on variance estimates.

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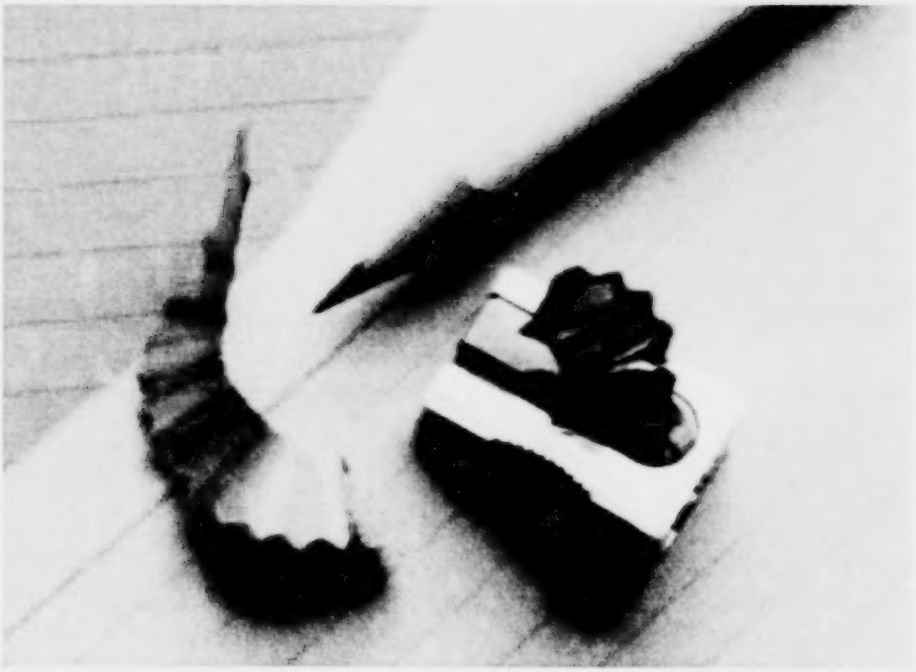


Annex B

Statistical models used for proficiency scaling

Results from the ISRS are reported on two of the four literacy scales, prose and document, established by the IALS and IALSS. With the scaling method employed, the performance of a sample of respondents can be summarized on a series of scales, even when the respondents have been administered a subset of assessment items from IALS and IALSS. A unique feature of the ISRS was to assess five new reading components.

This annex briefly describes the statistical models and procedures used to scale the ISRS results and estimate respondents' proficiencies. The text is an abridged version of a fuller description that can, upon request, be obtained from the ISRS survey co-ordinator at Statistics Canada.

Booklet design

Three blocks of items selected mainly from the pool of items created for IALS and IALSS were assembled: two main blocks containing about 15 prose and document items, and one additional block with nine core items most informative for the least skilled. The position of the two main blocks was alternated to balance order effects on item performance. Every respondent took both main blocks and the core block. About half of the samples received Block A before B, while the other half received Block B before A. Table B.1 shows the number of items in the blocks by literacy scale. Although the total number of literacy items administered to both samples is 40 for this survey, when combined with the prose and document items the respondent answered initially during the IALSS survey, the total number can reach 70 to 97 items, depending upon the booklet combinations.

Table B.1

Number of items by blocks

Block	Prose	Document	Total
		number	
Core	5	4	9
A	7	8	15
B	7	9	16
Total	**19**	**21**	**40**

Test items measuring the five component skills were administered subsequent to the literacy blocks. These component tests were available in English from existing clinical tests or from the US survey conducted in parallel. Some of these were also available in French, but in some cases the test items needed to be adapted from the English version. They showed appropriate ranges of difficulty for Level 1 and Level 2 populations. Table B.2 shows the number of test items used for each component skill.

Table B.2

Number of items in each of the component skill tests

Skill	Vocabulary	Digit-Span	Spelling	TOWRE-A	TOWRE-B	RAN-1	RAN-2
				number			
English items	57	30	15	104	63	50	26
French items	58	30	15	104	63	50	26

Most of the items used for the English and French assessment of component skills were different, though similar in number. Efforts were made to ensure a degree of similarity in the measurement properties of the component skills. Despite this, as described below, the English and French component test items relate differently to the literacy scales. Only the Digit-Span items are identical for both languages.

Overview of the analysis

The ISRS gathered descriptive and proficiency information from 1,815 sampled respondents through a background questionnaire and a series of assessment booklets. Sampling methods and survey procedures are described in Annex A.

Each respondent answered a common set of background questions in addition to those already collected during the IALSS survey. Responses to these background questions served two major purposes. First, they provided a way to summarize the survey results using descriptive variables such as gender, age, educational attainment, and country of birth. Second, they increased the accuracy of the proficiency estimates for various subpopulations, as described later. Because the data collection process did not require respondents to read any materials the background variables are independent of respondents' literacy proficiency.

To achieve acceptable content coverage of each literacy domain, the number of tasks in the assessment had to be quite large. However, since the items used in the ISRS were selected from previous international surveys their measurement parameters were known, having been established on the larger data set in terms of both sample size and item pool.

Respondents' literacy proficiencies were estimated based on their performance on the 40 cognitive tasks administered in the ISRS assessment in addition to their responses obtained from the IALSS. Unlike multiple-choice questions commonly used in large-scale surveys, which offer a fixed number of response options, open-ended items were used for this study. Because raw data is seldom useful by itself, responses must be grouped in some way in order to summarize the results. As they were scored, and in the ensuing analyses, responses to the ISRS open-ended items were classified into four categories: correct, incorrect, omitted, and not presented.

As noted earlier, even though a matrix design was not used in this study, all respondents had previously participated in the IALSS survey, so that each respondent could receive only a subset of the items in the pool. Accordingly, in reporting the survey results it is inappropriate to use any statistic based on the number of correct responses, such as the proportion of items answered correctly. Differences in total scores between respondents who took different sets of items may be caused by differences in respondents' abilities, difficulty between the two sets of items, or both. Unless one makes very strong assumptions – for example, that the two sets of items are perfectly parallel – the performance of the two groups assessed in a matrix sampling arrangement cannot be directly compared using total score statistics. Moreover, item-by-item reporting ignores the similarities of subgroup comparisons that are common across items. Finally, using the average percentage of items answered correctly to estimate proficiencies in a given subpopulation does not provide any other information about the distribution of skills within that subpopulation, such as the size of variances.

Item Response Theory (IRT) scaling capitalizes on the notion that when several items require similar skills, the response patterns should have some regularity. This regularity can be used to characterize both respondents and items in terms of a common standard scale, even when the respondents do not take identical sets of items. In this way, it becomes possible to discuss distributions of performance in a population or subpopulation and to estimate the relationships between proficiency and background variables. Regardless of the procedure used to aggregate data, a certain amount of information is considered non-essential to the analysis. The methods employed to analyze the ISRS results were carefully designed so as to capture most of the dominant characteristics of the data.

Scaling and analyses of the ISRS were carried out separately for each domain of cognitive skills, prose and document, and also for each component skill. By creating a separate scale for each, it remains possible to explore potential differences in subpopulation performance across these areas of skills.

Item analysis

Certain proportions of the booklets were rescored to improve data quality. Information about the scoring procedures used in the ISRS is given in Annex A. Conventional item analysis on the scored data was performed within block or within scale. Table B.3 shows the weighted average of proportions correct by block and scale for both samples, English and French.

Table B.3

Weighted average of proportions correct by block and scale

	English	French
	weighted average	
Core	98	96
Block A	81	70
Block B	84	80
PPVT-m/EVIP	95	89
Digit-Span/F	63	57
Digit-Span/B	46	41
Spelling	90	79
TOWRE-A	98	98
TOWRE-B	77	86
RAN-1	98	99
RAN-2	99	98
Prose	77	72
Document	84	76

Proportions of correct and omitted responses by item are provided in the full technical description and can be obtained from Statistics Canada. Due to the definition of "omitted response" compared to "not reached response," non-response of the last item in the block was considered as not reached instead of omitted. Proportions correct at block level were calculated using the number correct divided by the number administered, while proportions correct by scale were based on the number correct divided by the number attempted by the respondent. Some respondents did not attempt certain IALSS items administered. Because of this, the weighted proportions correct at block level are slightly different from those by scale.

Scaling methodology

The scaling model used for the ISRS is the two-parameter logistic (2PL) model from the Item Response Theory (Birnbaum, 1968; Lord, 1980) for literacy items as well as most component items. It is a mathematical model estimating the probability that a person will respond correctly to a particular item from a single domain of items. This probability is given as a function of a parameter characterizing the proficiency of that person, and two parameters characterizing the properties of that item. The following 2PL IRT model was employed in the ISRS:

$$P(x_{ij} = 1 \mid \theta_j, a_i, b_i) = \frac{1}{1.0 + \exp(-Da_i(\theta_j - b_i))} \qquad (1)$$

where,

x_{ij} is the response of person j to item i, 1 if correct and 0 if incorrect;

θ_j is the proficiency of person j (note that a person with higher proficiency has a greater probability of responding correctly);

a_i is the slope parameter of item i, characterizing its sensitivity to proficiency;

b_i is its locator parameter, characterizing its difficulty.

The main assumption of IRT is conditional independence. In other words, item response probabilities depend only on θ (a measure of proficiency) and the specified item parameters, and not on any demographic characteristics of respondents, on any other items presented together in a test, or on the survey administration conditions. This enables one to formulate the following joint probability of a particular response pattern x across a set of n items.

$$P(\underline{x}|\theta,\underline{a},\underline{b}) = \prod_{i=1}^{n} P_i(\theta)^{x_i} \cdot (1 - P_i(\theta))^{1-x_i} \qquad (2)$$

Replacing the hypothetical response pattern with the real scored data, the above function can be viewed as a likelihood function that is to be maximized with a given set of item parameters. These item parameters were treated as known for the subsequent analyses.

Another assumption of the model is unidimensionality – that is, performance on a set of items is accounted for by a single unidimensional variable. Although this assumption may be too strong, the use of the model is motivated by the need to summarize overall performance parsimoniously within a single domain. Hence, item parameters were estimated for each scale separately. Testing the assumption of conditional independence is a critical part of the data analysis. Conditional independence means that respondents with identical ability have a similar probability of producing a correct response on an item regardless of any differences they may have in demographic variables or responses on other items. This assumption applies to both samples. Serious violation of the conditional independence assumption would undermine the accuracy and integrity of the results. It is common to find a subset of items to be unusable for a particular subpopulation. Thus, while the item parameters were being estimated, empirical conditional percentages correct were monitored across the samples.

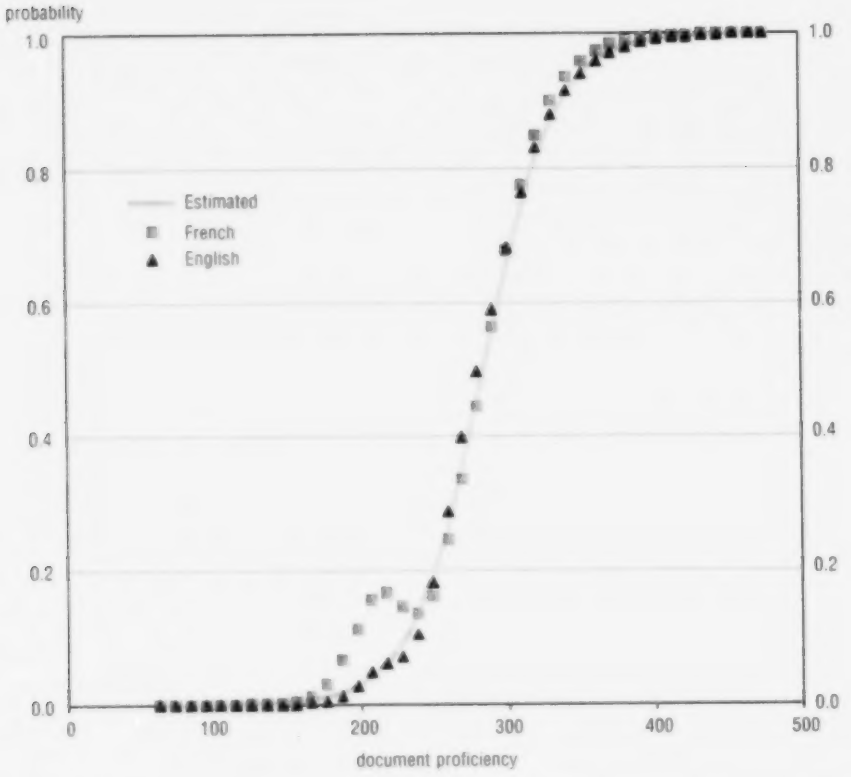
Item parameter estimation

Identical item calibration procedures were carried out separately for the two literacy scales as well as component skills. Two different levels of fit in the IRT model were considered. The first is the fit of the data to the existing item parameters derived from the IALS and IALSS surveys and the US study. Sufficient fit of these parameters to the data ensures linkage of the scale and the comparability of the inferences to be made based on the scale. The second is the fit of the IRT model to the English and French samples. The fit of the two-parameter logistic IRT parameters estimated on the basis of the IALS and IALSS for common items was evaluated with respect to both samples using weights. Post-stratified weights take into account the sampling design such as over sampling as well as the randomness of real data. By applying post-stratified weights, vital characteristics of the sample can be closely matched to the characteristics of the population. During calibration, the fit of item parameters is maximized along the proficiency distribution of the calibration sample.

Model fit was evaluated by likelihood ratio statistics as well as inspecting residuals from fitted item response curves. The residuals were also summarized into Root Mean Squared Deviations and Mean Deviations. In general, the fit of the model to the data was quite good. The great majority of responses were accurately described by the common item parameters. For some items, there was evidence that the parameters did not fit as well to a certain assessment sample. The item parameters for newly introduced items were estimated simultaneously. The existing item parameters did not describe a few items very well for some subpopulations.

Chart B.1

Item response curve for an ISRS task, 2005



In Chart B.1, the smooth lines are the fitted two-parameter logistic item response curves and the legends are the (approximate) expected proportions of correct response at various points along the document literacy scale for two subpopulations. The plot indicates that the observed proportions correct given proficiency are quite similar for both subpopulations between the scale scores of 130 and 330 points. However, data from the French speaking subpopulation indicate greater departure from the common item characteristic curve of the solid line in the lower proficiency range around 210 points. The greater deviation is partly due to the much smaller sample size of the French speaking subpopulation.

Item parameters common to IALS and IALSS fit quite well for both French and English samples. Only one document item for the French sample received a different item parameter. A common set of item parameters establishes the comparability of inferences between the ISRS data and data from other international assessments such as IALS and IALSS.

The scaling of component items for the English sample was done using similar procedures because known item parameters from the US survey could be used. However, since the items for most of the component skills, except Digit-Span, are different between the English and French test booklets, the item parameters for French component skills were estimated based on the ISRS data alone. Item

parameters for Digit-Span originally estimated on the basis of the US survey data fit well to the data from Canadian samples. Evaluation of fit of the item parameters was carried out for each of the component skills separately.

Proficiency estimation using plausible values

The measurement of cognitive skills usually involves accurately assessing the performance of individual respondents for the purposes of diagnosis, selection or placement. Regardless of which measurement model is used, classical test theory or item response theory, the accuracy of these measurements can be improved – that is, the amount of measurement error can be reduced – by increasing the number of items given to the individual. Thus, achievement tests containing more than 70 items are common. Since the uncertainty associated with each θ is negligible, the distribution of θ or the joint distribution of θ with other variables can be approximated using individual θs.

When analyzing the distribution of proficiencies in a group of persons, however, more efficient estimates can be obtained from a sampling design similar to that used in the ISRS. The survey solicits relatively few responses from each sampled respondent. The advantage of estimating population characteristics more efficiently is offset by the inability to make precise statements about individuals. Uncertainty associated with individual θ estimates is too large to be ignored. Point estimates of proficiency that are, in some sense, optimal for each sampled respondent could lead to seriously biased estimates of population characteristics. (Wingersky, Kaplan and Beaton, 1987).

Plausible value methodology was developed as a way to estimate key population features consistently and to approximate others no worse than standard IRT procedures would. A detailed review of plausible value methodology is given in Mislevy (1991) and has been developed further more recently by Thomas (2002) and Davier and Sinharay (2004). Along with theoretical justifications, Mislevy, Beaton, Kaplan and Sheehan (1992) present comparisons with standard procedures, discuss biases that arise in some secondary analyses, and offer numerical examples. An overview of the plausible values approach, focusing on its implementation in the ISRS analyses, is given in the full version of this technical annex.

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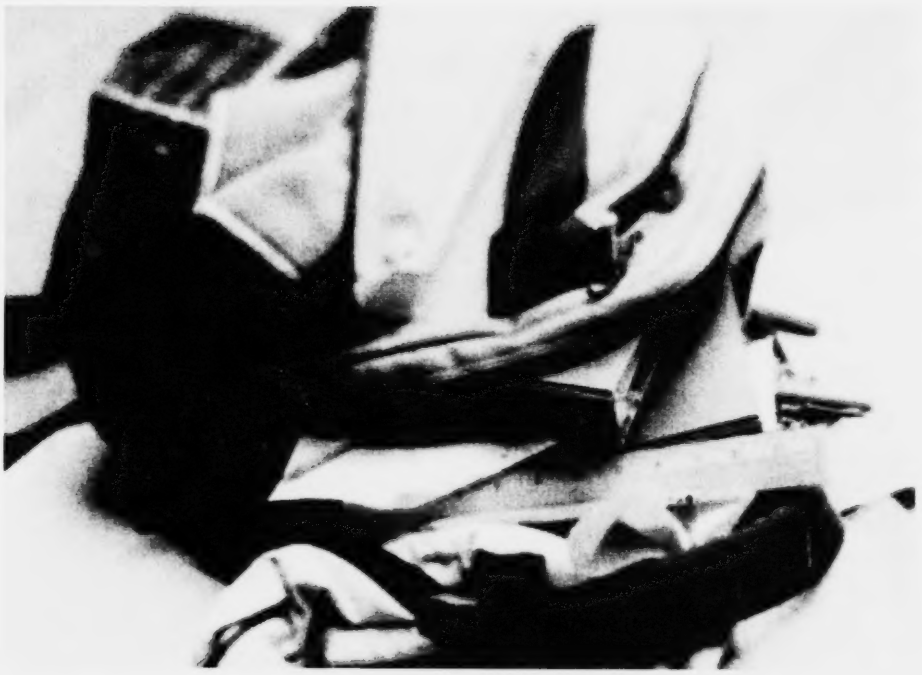


Annex C

Statistical tables

Table C.2.1

Distribution in numbers and percentages of prose proficiency levels by age, population aged 16 to 65, Canada excluding Territories, 2003

	numbers	percent	standard error
Level 1			
16 to 25	394,761	12.7	(1.1)
26 to 35	411,300	13.2	(1.3)
36 to 45	770,794	24.8	(1.8)
46 to 55	723,020	23.2	(1.1)
56 to 65	811,487	26.1	(1.5)
Level 2			
16 to 25	1,181,233	20.3	(1.2)
26 to 35	1,037,675	17.8	(1.3)
36 to 45	1,401,835	24.1	(1.4)
46 to 55	1,259,385	21.7	(1.0)
56 to 65	934,934	16.1	(1.0)
Levels 3, 4 and 5			
16 to 25	2,600,945	21.0	(0.7)
26 to 35	2,882,016	23.3	(0.6)
36 to 45	3,069,547	24.8	(0.8)
46 to 55	2,551,009	20.6	(0.6)
56 to 65	1,274,045	10.3	(0.5)

Table C.2.2

Distribution in numbers and percentages of proficiency levels by educational attainment, population aged 16 to 65, Canada excluding Territories, 2003

	numbers	percent	standard error
Level 1			
Less than high school	1,562,124	50.2	(1.7)
High school diploma	943,426	30.3	(1.4)
Non-university post-secondary	363,160	11.7	(1.1)
University degree	242,433	7.8	(0.9)
Level 2			
Less than high school	1,597,940	27.5	(1.2)
High school diploma	2,166,256	37.3	(1.6)
Non-university post-secondary	1,230,828	21.2	(1.2)
University degree	818,592	14.1	(1.0)
Levels 3, 4 and 5			
Less than high school	1,310,400	10.6	(0.6)
High school diploma	3,890,131	31.4	(0.9)
Non-university post-secondary	3,191,657	25.8	(0.8)
University degree	3,983,800	32.2	(0.8)

Table C.2.3

Distribution in numbers and percentages of prose proficiency levels by gender, population aged 16 to 65, Canada excluding Territories, 2003

	numbers	percent	standard error
Level 1			
Men	1,668,674	53.6	(2.0)
Women	1,442,688	46.4	(2.0)
Level 2			
Men	3,029,926	52.1	(1.9)
Women	2,785,136	47.9	(1.9)
Levels 3, 4 and 5			
Men	5,961,711	48.2	(1.0)
Women	6,415,851	51.8	(1.0)

Table C.2.4

Distribution in numbers and percentages of prose proficiency levels by language of assessment, population aged 16 to 65, Canada excluding Territories, 2003

	numbers	percent	standard error
Level 1			
English	2,375,260	14.3	(0.5)
French	736,102	15.6	(0.8)
Level 2			
English	4,208,085	25.4	(0.8)
French	1,606,978	34.1	(1.4)
Levels 3, 4 and 5			
English	10,004,602	60.3	(0.9)
French	2,372,960	50.3	(1.3)

Table C.2.5

Distribution in percentage of Canadian born and immigrants by prose proficiency levels, population aged 16 to 65, Canada excluding Territories, 2003

	percent	standard error
Canadian born		
Level 1	10.1	(0.5)
Level 2	27.1	(0.8)
Levels 3, 4 and 5	62.8	(0.8)
Immigrants		
Level 1	32.0	(1.5)
Level 2	28.1	(1.4)
Levels 3, 4 and 5	39.9	(1.7)

Table C.2.6

Distribution in numbers and percentages within prose proficiency levels by immigrant status, population aged 16 to 65, Canada excluding Territories, 2003

	numbers	percent	standard error
Level 1			
Canadian born	1,704,567	54.9	(1.9)
Immigrants	1,406,795	45.1	(1.9)
Level 2			
Canadian born	4,582,035	78.8	(1.0)
Immigrants	1,233,027	21.2	(1.0)
Levels 3, 4 and 5			
Canadian born	10,627,301	85.9	(0.5)
Immigrants	1,750,261	14.1	(0.5)

Table C.2.7

Distribution in numbers and percentages of prose proficiency levels, by language of assessment and immigrant status, population aged 16 to 65, Canada excluding Territories, 2003

	numbers	percent	standard error
Level 1			
English			
Canadian born	1,071,723	45.1	(2.5)
Immigrants	1,303,537	54.9	(2.5)
French			
Canadian born	632,844	86.0	(1.8)
Immigrants	103,258	14.0	(1.8)
Level 2			
English			
Canadian born	3,084,325	73.4	(1.4)
Immigrants	1,123,760	26.6	(1.4)
French			
Canadian born	1,497,711	93.2	(1.2)
Immigrants	109,267	6.8	(1.2)
Levels 3, 4 and 5			
English			
Canadian born	8,410,682	84.1	(0.6)
Immigrants	1,593,920	15.9	(0.6)
French			
Canadian born	2,216,619	93.4	(0.9)
Immigrants	156,341	6.6	(0.9)

Table C.2.8

Distribution in numbers and percentages of prose proficiency levels by mother tongue, population aged 16 to 65, Canada excluding Territories, 2003

	numbers	percent	standard error
Level 1			
English	1,049,009	33.7	(2.0)
French	712,047	22.9	(1.1)
English and French	8,513	0.3	(0.1)
Other than English or French	1,341,793	43.1	(1.7)
Level 2			
English	2,971,640	51.1	(1.4)
French	1,658,481	28.5	(0.9)
English and French	18,657	0.3	(0.1)
Other than English or French	1,166,284	20.1	(0.1)
Levels 3, 4 and 5			
English	8,110,110	65.5	(0.7)
French	2,527,609	20.4	(0.5)
English and French	49,733	0.4	(0.1)
Other than English or French	1,690,110	13.7	(0.6)

Table C.2.9

Distribution in numbers and percentages of prose proficiency levels and reading practices, population aged 16 to 65, Canada excluding Territories, 2003

	numbers	percent	standard error
Level 1			
Read books at least once a week	747,754	24.0	(1.7)
Read books less than once a week	327,954	10.5	(1.2)
Rarely or never read books	2,032,846	65.3	(1.9)
Level 2			
Read books at least once a week	2,088,468	35.9	(1.4)
Read books less than once a week	892,876	15.3	(1.4)
Rarely or never read books	2,830,427	48.7	(1.7)
Levels 3, 4 and 5			
Read books at least once a week	6,702,868	54.2	(0.9)
Read books less than once a week	2,335,166	18.9	(0.8)
Rarely or never read books	3,334,091	26.9	(0.8)

Table C.2.10

Distribution in numbers and percentages of prose proficiency levels by labour force status, population aged 16 to 65, Canada excluding Territories, 2003

	numbers	percent	standard error
Level 1			
Not in the labour force	972,918	31.3	(1.4)
Unemployed	359,388	11.6	(1.2)
Employed	1,775,482	57.1	(1.8)
Level 2			
Not in the labour force	1,224,386	21.1	(0.9)
Unemployed	484,124	8.3	(0.8)
Employed	4,101,187	70.5	(1.3)
Levels 3, 4 and 5			
Not in the labour force	2,043,962	16.5	(0.7)
Unemployed	739,492	6.0	(0.5)
Employed	9,579,005	77.4	(0.8)

Table C.2.11

Distribution in numbers and percentages of prose proficiency levels by annual income quartiles, population aged 16 to 65, Canada excluding Territories, 2003

	numbers	percent	standard error
Level 1			
1st quartile	915,460	29.4	(1.4)
2nd quartile	1,108,288	35.6	(1.5)
3rd quartile	737,645	23.7	(1.6)
4th quartile	194,437	6.2	(1.2)
Level 2			
1st quartile	1,312,805	22.6	(1.2)
2nd quartile	1,794,948	30.9	(1.7)
3rd quartile	1,744,465	30.0	(1.6)
4th quartile	760,500	13.1	(1.0)
Levels 3, 4 and 5			
1st quartile	2,288,991	18.5	(0.7)
2nd quartile	2,802,989	22.6	(0.9)
3rd quartile	3,851,377	31.1	(1.1)
4th quartile	3,041,480	24.6	(0.8)

Table C.2.12

Distribution of mother tongue, by immigrant status, Canada excluding Territories, population aged 16 to 65, 2003

	numbers	percent	standard error
Canadian born			
Mother tongue English or French	15,946,017	94.3	(0.3)
Mother tongue other than English or French	967,886	5.7	(0.3)
Immigrant			
Mother tongue English or French	1,159,782	26.4	(1.2)
Mother tongue other than English or French	3,230,301	73.6	(1.2)

Table C.2.13

Distribution of mother tongue, by immigrant status, and language of assessment, Canada excluding Territories, population aged 16 to 65, 2003

	Canadian born			Immigrants		
	numbers	percent	standard error	numbers	percent	standard error
English						
Mother tongue English or French	11,643,938	92.7	(0.5)	1,015,999	25.3	(1.5)
Mother tongue other than English or French	922,792	7.3	(0.5)	3,005,219	74.7	(1.5)
French						
Mother tongue English or French	4,302,079	99.0	(0.2)	143,783	39.0	(3.2)
Mother tongue other than English or French	45,095	1.0	(0.2)	14,433	61.0	(3.2)

Table C.2.14

Distribution in numbers and percentages of prose proficiency levels, by language of assessment and mother tongue, population aged 16 to 65, Canada excluding Territories, 2003

	numbers	percent	standard error
Level 1			
English			
English	1,041,724	43.8	(2.2)
French	74,588	3.1	(0.4)
English and French	3,972	0.2	(0.1)
Other than English or French	1,254,976	52.9	(2.2)
French			
English	7,285	1.0	(0.6)
French	637,458	86.6	(1.9)
English and French	4,541	0.6	(0.4)
Other than English or French	86,817	11.8	(1.8)
Level 2			
English			
English	2,955,518	70.2	(1.6)
French	158,577	3.8	(0.4)
English and French	13,697	0.3	(0.2)
Other than English or French	1,080,293	25.7	(1.6)
French			
English	16,122	1.0	(0.5)
French	1,499,904	93.3	(0.9)
English and French	4,960	0.3	(0.2)
Other than English or French	85,992	5.3	(0.9)
Levels 3, 4 and 5			
English			
English	8,060,618	80.6	(0.8)
French	308,520	3.1	(0.2)
English and French	42,722	0.4	(0.2)
Other than English or French	1,592,742	15.9	(0.7)
French			
English	49,492	2.1	(0.5)
French	2,219,089	93.5	(0.8)
English and French	7,011	0.3	(0.2)
Other than English or French	97,368	4.1	(0.7)

Table C.2.15

Distribution in numbers and percentages of prose proficiency levels, by labour force status, population aged 16 to 65, Canada excluding Territories, 2003

	numbers	percent	standard error
Level 1			
English			
Not in the labour force	734,299	30.9	(1.7)
Unemployed	262,938	11.1	(1.3)
Employed	1,374,449	57.9	(2.2)
French			
Not in the labour force	238,620	32.4	(2.3)
Unemployed	96,449	13.1	(2.0)
Employed	401,033	54.5	(2.5)
Level 2			
English			
Not in the labour force	844,261	20.1	(1.1)
Unemployed	373,324	8.9	(1.2)
Employed	2,985,134	70.9	(1.6)
French			
Not in the labour force	380,125	23.7	(1.6)
Unemployed	110,800	6.9	(1.0)
Employed	1,116,052	69.5	(1.5)
Levels 3, 4 and 5			
English			
Not in the labour force	1,567,438	15.7	(0.7)
Unemployed	642,850	6.4	(0.5)
Employed	7,779,211	77.8	(0.9)
French			
Not in the labour force	476,523	20.1	(1.5)
Unemployed	96,643	4.1	(0.5)
Employed	1,799,794	75.8	(1.5)

Table C.2.16

Prose proficiency mean scores by language of assessment and prose proficiency levels, population aged 16 to 65, Canada excluding Territories, 2003

	mean score	standard error
Level 1		
English	184	(1.7)
French	194	(1.7)
Level 2		
English	255	(0.7)
French	254	(0.7)
Levels 3, 4 and 5		
English	318	(0.8)
French	312	(0.9)

Table C.2.17

Prose mean scores by proficiency levels, by language of assessment and immigrant status, population aged 16 to 65, Canada excluding Territories, 2003

	mean score	standard error
Level 1		
English		
Canadian born	193	(2.6)
Immigrant	177	(2.2)
French		
Canadian born	195	(1.4)
Immigrant	185	(5.9)
Level 2		
English		
Canadian born	256	(0.8)
Immigrant	252	(0.8)
French		
Canadian born	254	(0.8)
Immigrant	252	(3.3)
Levels 3, 4 and 5		
English		
Canadian born	319	(0.8)
Immigrant	311	(1.4)
French		
Canadian born	312	(0.9)
Immigrant	312	(3.7)

Table C.3.1

Observed scores on each component by score on the prose scale, English, Canada excluding territories, population aged 16 to 65, 2003

	English prose literacy score									
	166	211	230	244	260	274	288	303	321	345
Proportion correct by test for points estimates										
Vocabulary	0.7	0.8	0.9	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Digit-Span	0.4	0.4	0.5	0.5	0.5	0.5	0.5	0.5	0.6	0.6
Spelling	0.3	0.6	0.8	0.9	0.9	0.9	1.0	1.0	1.0	1.0
Real Word	0.6	0.8	0.9	0.9	0.9	0.9	1.0	1.0	1.0	1.0
Pseudo-word	0.3	0.5	0.5	0.6	0.6	0.7	0.8	0.7	0.8	0.9
Proportion correct by test for curve										
Vocabulary	0.7	0.9	0.9	0.9	1.0	1.0	1.0	1.0	1.0	1.0
Digit-Span	0.3	0.4	0.4	0.5	0.5	0.5	0.5	0.5	0.6	0.6
Spelling	0.3	0.7	0.8	0.8	0.9	0.9	1.0	1.0	1.0	1.0
Real Word	0.6	0.8	0.9	0.9	0.9	0.9	1.0	1.0	1.0	1.0
Pseudo-word	0.3	0.5	0.6	0.6	0.7	0.7	0.7	0.8	0.8	0.9

Table C.3.2

Observed scores on each component by score on the prose scale, French, Canada excluding territories, population aged 16 to 65, 2003

	French prose literacy score								
	184	228	249	262	274	285	297	310	339
Proportion correct by test for points estimates									
Vocabulary	0.9	0.8	0.9	0.9	0.9	0.9	0.9	0.9	0.9
Digit-Span	0.4	0.4	0.5	0.4	0.5	0.5	0.5	0.5	0.6
Spelling	0.5	0.7	0.7	0.8	0.8	0.9	0.9	0.9	0.9
Pseudo-word	0.7	0.8	0.8	0.9	0.9	0.9	0.9	0.9	0.9
Proportion correct by test for curve									
Vocabulary	0.8	0.9	0.9	0.9	0.9	0.9	0.9	0.9	1.0
Digit-Span	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.5	0.5
Spelling	0.5	0.7	0.8	0.8	0.8	0.8	0.9	0.9	0.9
Pseudo-word	0.7	0.8	0.9	0.9	0.9	0.9	0.9	0.9	0.9

Table C.3.3

Distribution by percentage of correct scores, Real Word Reading test, English, Canada excluding territories, population aged 16 to 65, 2003

	Real Word	
Percentage correct Real Word	percent	standard error
Less than 80	18.5	(1.7)
Between 80 and 90	16.8	(0.1)
Greater than 90	64.7	(1.9)

Table C.3.4

Distribution by percentage of correct scores,
Pseudo-word Reading test, English and French,
Canada excluding territories, population aged 16 to 65, 2005

	English		French	
Percentage correct Pseudo-word	percent	standard error	percent	standard error
Less than 80	66.8	(2.2)	57.4	(2.8)
Between 80 and 90	19.0	(2.1)	27.3	(2.6)
Greater than 90	14.2	(1.7)	15.3	(1.8)

Table C.3.5

Distribution by percentage of correct scores,
Spelling test, English and French,
Canada excluding territories, population aged 16 to 65, 2005

	English		French	
Percentage correct Spelling	percent	standard error	percent	standard error
Less than 80	15.0	(1.9)	37.0	(2.8)
Between 80 and 90	19.7	(2.1)	30.1	(2.7)
Greater than 90	65.7	(2.4)	33.0	(3.1)

Table C.3.6

Distribution by percentage of correct scores,
Vocabulary test, English and French,
Canada excluding territories, population aged 16 to 65, 2005

	English		French	
Percentage correct Vocabulary	percent	standard error	percent	standard error
Less than 80	6.3	(1.3)	6.1	(1.1)
Between 80 and 90	6.9	(1.1)	24.4	(2.4)
Greater than 90	86.8	(1.5)	69.5	(2.7)

Table C.3.7

Percentile distribution, factor rate of
letters-per-second, English and French,
Canada excluding territories, population aged 16 to 65, 2005

	Letters per second	
	English	French
5th percentile	1.1	1.3
10th percentile	1.4	1.4
50th percentile	2.2	2.1

Table C.3.8

Distribution by percentage of correct scores,
Digit-Span test, English and French,
Canada excluding territories, population aged 16 to 65, 2005

	English		French	
Percentage correct Digit-Span	percent	standard error	percent	standard error
Less than 50	31.7	(2.1)	44.8	(2.3)
Between 50 and 80	66.2	(2.3)	52.4	(2.3)
Greater than 80	2.1	(0.7)	2.8	(0.8)

Table C.4.1

Observed scores on each component by score on the prose scale, French, Canada excluding territories, population aged 16 to 65, 2005

	French prose literacy score								
	184	228	249	262	274	285	297	310	339
Proportion correct by test for points estimates									
Vocabulary	0.9	0.8	0.9	0.9	0.9	0.9	0.9	0.9	0.9
Digit-Span	0.4	0.4	0.5	0.4	0.5	0.5	0.5	0.5	0.6
Spelling	0.5	0.7	0.7	0.8	0.8	0.9	0.9	0.9	0.9
Pseudo-word	0.7	0.8	0.8	0.9	0.9	0.9	0.9	0.9	0.9
Proportion correct by test for curve									
Vocabulary	0.8	0.9	0.9	0.9	0.9	0.9	0.9	0.9	1.0
Digit-Span	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.5	0.5
Spelling	0.5	0.7	0.8	0.8	0.8	0.8	0.9	0.9	0.9
Pseudo-word	0.7	0.8	0.9	0.9	0.9	0.9	0.9	0.9	0.9

Table C.4.2

Observed scores on each component by score on the prose scale, English, Canada excluding territories, population aged 16 to 65, 2005

	English prose literacy score									
	166	211	230	244	260	274	288	303	321	345
Proportion correct by test for points estimates										
Vocabulary	0.7	0.8	0.9	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Digit-Span	0.4	0.4	0.5	0.5	0.5	0.5	0.5	0.5	0.6	0.6
Spelling	0.3	0.6	0.8	0.9	0.9	0.9	1.0	1.0	1.0	1.0
Real word	0.6	0.8	0.9	0.9	0.9	0.9	1.0	1.0	1.0	1.0
Pseudo-word	0.3	0.5	0.5	0.6	0.6	0.7	0.8	0.7	0.8	0.9
Proportion correct by test for curve										
Vocabulary	0.7	0.9	0.9	0.9	1.0	1.0	1.0	1.0	1.0	1.0
Digit-Span	0.3	0.4	0.4	0.5	0.5	0.5	0.5	0.5	0.6	0.6
Spelling	0.3	0.7	0.8	0.8	0.9	0.9	1.0	1.0	1.0	1.0
Real word	0.6	0.8	0.9	0.9	0.9	0.9	1.0	1.0	1.0	1.0
Pseudo-word	0.3	0.5	0.6	0.6	0.7	0.7	0.7	0.8	0.8	0.9

Table C.4.3

Proportion of native speakers by ISRS test language and IALSS prose proficiency level, English and French, population aged 16 to 65, Canada excluding Territories, 2005

	English						French					
	Level 1		Level 2		Levels 3, 4 and 5		Level 1		Level 2		Levels 3, 4 and 5	
	percent	standard error	percent	standard error	percent	standard error	percent	standard error	percent	standard error	percent	standard error
Native language	49.9	(7.7)	78.2	(3.1)	91.5	(1.2)	84.2	(6.3)	95.2	(1.6)	95.8	(1.2)
Non-native language	50.1	(7.7)	21.8	(3.1)	8.5	(1.2)	F	F	F	F	F	F

F too unreliable to be published

Table C.4.4

Proportion of native readers by ISRS test language and IALSS level, English and French, population aged 16 to 65, Canada excluding Territories, 2005

	English						French					
	Level 1		Level 2		Levels 3, 4 and 5		Level 1		Level 2		Levels 3, 4 and 5	
	percent	standard error	percent	standard error	percent	standard error	percent	standard error	percent	standard error	percent	standard error
Native language	55.3	(6.0)	79.0	(3.2)	90.8	(1.4)	90.1	(4.8)	97.5	(1.2)	98.2	(0.8)
Non-native language	44.4	(1.2)	21.0	(2.1)	9.2	(1.9)	F	F	F	F	F	F

F too unreliable to be published

Table C.4.5

Proportion of ISRS respondents in English and French who report reading a book at least once a week, by language, population aged 16 to 65, Canada excluding Territories, 2005

	Level 1		Level 2		Level 3		Levels 4 and 5	
Read book weekly	percent	standard error	percent	standard error	percent	standard error	percent	standard error
English	32.2	(8.3)	37.3	(5.1)	57.2	(4.5)	69.1	(5.5)
French	26.8	(6.2)	35.6	(4.7)	45.7	(4.7)	48.9	(8.3)

Table C.4.6

Average proportion correct scores on each component displayed separately for each latent class, English and French combined, population aged 16 to 65, Canada excluding Territories, 2005

	Vocabulary		Real Word recognition		Pseudo-word recognition		Spelling		Digit-Span	
	proportion correct	standard error	proportion correct	standard error	proportion correct	standard error	proportion correct	standard error	proportion correct	standard error
Class A	0.68	(0.4)	0.54	(0.3)	0.26	(0.2)	0.34	(0.2)	0.24	(0.3)
Class B	0.63	(0.2)	0.84	(0.3)	0.59	(0.3)	0.39	(0.2)	0.45	(0.3)
Class C	0.90	(0.1)	0.78	(0.2)	0.54	(0.2)	0.45	(0.1)	0.76	(0.2)
Class D	0.95	(0.0)	0.96	(0.0)	0.79	(0.0)	0.55	(0.0)	0.93	(0.0)

Table C.4.7a

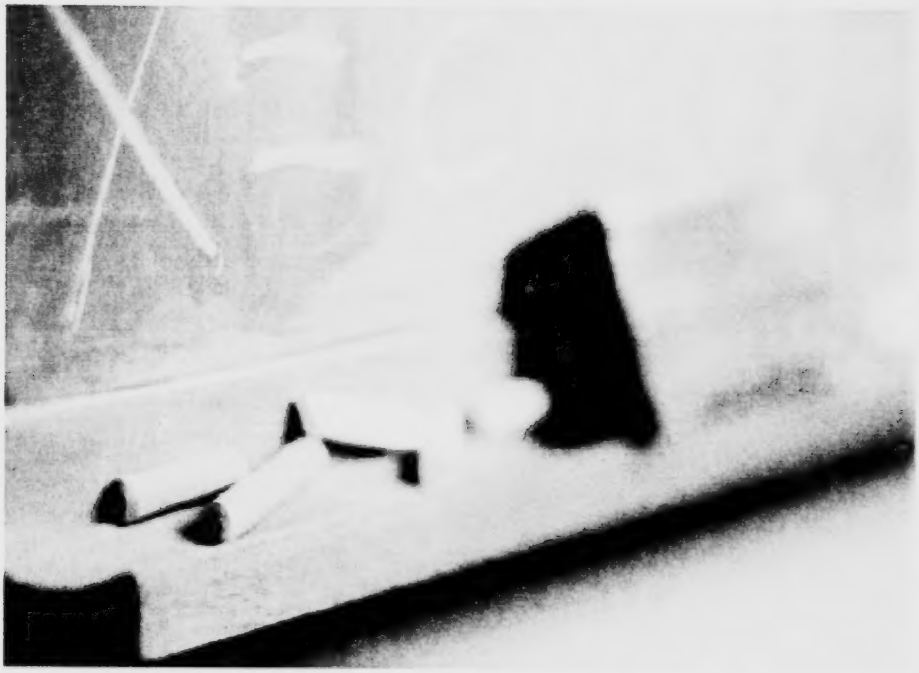
Mean scores with .95 confidence intervals and scores at the 5th, 25th, 75th and 95th percentile on the prose proficiency scale for each latent class, French, population aged 16 to 65, Canada excluding Territories, 2005

	5th percentile		25th percentile		Mean		75th percentile		95th percentile	
Prose literacy scale	score	standard error	score	standard error	score	standard error	score	standard error	score	standard error
Class A	112	(24.0)	158	(23.2)	178	(14.6)	203	(18.4)	235	(11.7)
Class B	155	(11.0)	182	(8.9)	200	(6.4)	219	(11.3)	241	(6.2)
Class C	199	(11.3)	219	(5.4)	244	(4.0)	265	(6.3)	307	(14.6)
Class D	234	(6.8)	269	(3.8)	293	(1.2)	315	(2.9)	354	(4.5)

Table C.4.7b

Mean scores with .95 confidence intervals and scores at the 5th, 25th, 75th and 95th percentile on the prose proficiency scale for each latent class, English, population aged 16 to 65, Canada excluding Territories, 2005

	5th percentile		25th percentile		Mean		75th percentile		95th percentile	
Prose literacy scale	score	standard error	score	standard error	score	standard error	score	standard error	score	standard error
Class A	100	(20.9)	152	(10.4)	178	(9.7)	208	(24.6)	253	(21.6)
Class B	127	(20.6)	189	(18.8)	207	(7.7)	221	(15.9)	268	(8.7)
Class C	191	(9.5)	222	(8.2)	256	(5.8)	292	(8.6)	335	(13.9)
Class D	240	(2.7)	276	(2.9)	302	(2.3)	328	(2.9)	362	(8.9)



Annex D

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